

Impact of Educational Program regarding Bronchial Asthma of Children on Caregivers' Knowledge and Practices

Ekhlas Nabil Shalaby⁽¹⁾, Eman Sayed Masoud⁽²⁾, Al-Shaimaa Gamal Hasan⁽³⁾, Yossra Samir fadle⁽⁴⁾

1. Bachelor of Nursing, Faculty of Nursing - Minia University.
 2. Professor of Pediatric Nursing, Faculty of Nursing – Minia University.
 3. Lecturer of Pediatric Nursing Faculty of Nursing - Minia University.
 4. Lecturer of Pediatrics Faculty of Medicine –Minia University.
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Abstract

Background: Asthma is a long-term respiratory inflammatory disease characterized by chronic lung inflammation, which affects up to 18% of people worldwide. Asthma affects all age groups and is a lifetime condition. **Aim:** to evaluate the impact of educational program regarding bronchial asthma of children on caregivers' knowledge and practices. **Design:** Quasi-experimental research design (pre-posttest) was used in the current study. **Setting:** The current study was conducted in the outpatient chest clinic at Minia University Hospital for Gynecology, Obstetrics and pediatrics located in Minia city. **Subjects:** A Purposive sample of 60 caregivers of children with bronchial asthma was participated in the study. **Tools:** **Tool (I):** Structured interview questionnaire, classified into 5 parts, Part (1): Socio-demographic characteristics of caregivers, Part (2): Socio-demographic characteristics of children, Part (3): Past medical data of child, Part (4): Current medical data of child, Part (5): Caregivers' knowledge regarding bronchial asthma of children and **Tool (II):** Reported practices of the caregivers and their children regarding bronchial asthma. The time of beginning of data collection from first October 2023 to the end of March, 2024. **Results:** It was found that all caregivers had satisfactory level of knowledge and practices in post –program compared to less than one quarter pre-program **Conclusion:** The study concluded that the educational program for caregivers and children with bronchial asthma was effective by means of marked improvement of knowledge and practices. **Recommendation:** The study recommended that regular asthma education should be integrated into pediatric care services to improve caregivers' knowledge and practices.

Keywords: *Bronchial Asthma, Caregivers, Knowledge, Practices, Educational program.*

Introduction

Bronchial Asthma is the most common chronic, non-communicable disease among children with an estimated prevalence ranging from 3 % to 38 % in various geographical locations worldwide. The Global Initiative for Asthma (GINA) describes asthma as “a heterogeneous disease characterized by chronic airway inflammation. It is defined by a history of respiratory symptoms such as wheezing, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation” (Gowda et al., 2025).

Asthma is a widespread condition with substantial global health implications, affecting an estimated 300 million people worldwide. By 2025,

this condition is expected to reach 400 million, driven by factors such as urbanization, environmental pollution, atopy, and lifestyle changes. Asthma is a pathological condition characterized by chronic airway inflammation, which progressively leads to structural damage and remodeling of the bronchial wall (Indolfi et al., 2025).

Several main factors are associated with the development of asthma in children, including genetic predispositions, immunizations, diet, and exposure to allergens, pollutants, endotoxins, parasites, and viruses. Children under five years' experience one episode of asthmatic symptoms, including wheezing, coughing, or dyspnea (Sapartini et al., 2025).

Viral respiratory infections are a major cause of acute asthma exacerbations and contribute to the development of asthma in young children at high risk and with a susceptible genetic background. A history of wheezing associated with respiratory viral infections in early life is one of the main risk factors for later development of asthma, along with sensitization to aeroallergens in early life and a family history of asthma and allergy, which reflects a genetic predisposition. Respiratory viral infections are also the main cause of asthma exacerbations in children and adults (**Ennadif et al., 2024**).

Pathological airway remodeling is a hallmark feature of asthma and includes thickening of airway-associated smooth muscle, increased collagen deposition and thickening of the reticular basement membrane (RBM; underlying the airway epithelium), leading to reduced airway luminal diameter. Although pathological airway remodeling was previously believed to be a response to airway wall injury, more recent evidence suggests that airway remodeling can occur prior to the development of asthma (**Hammond et al., 2025**).

Asthma exacerbations are severe episodes in which symptoms, such as cough, shortness of breath, wheezing, and chest tightness, worsen significantly. They occur across the spectrum of chronic severity, from intermittent asthma to severe persistent asthma (**Lee et al., 2025**).

The importance of the nurse in stabilizing the patient's condition and increasing the remission period in bronchial asthma (BA) is multifaceted, it is in the therapeutic activity: the use and application methods of the medicines taken by the doctor are explained by the nurse. The state of nursing care provided to children with BA has not been studied. To improve the health of children with BA, to monitor and evaluate the activities of secondary medical nurses in preventing or eliminating the disease, to communicate directly with parents about the health of children with BA, their medical culture, the effectiveness of the provided medical service electronic digitization aimed at increasing was not carried out (**Urazaliyeva & Matyakubova, 2025**).

Asthma education aims to teach children and caregivers how to manage their asthma using a partnership between the patient and healthcare professionals. Components of asthma education include information about asthma; training in managing asthma, including how to use inhalers effectively; a management strategy; and encouragement to use medications correctly.

Monitoring of asthma, such as with a peak flow meter (a hand-held device that measures how quickly you can breathe out fully) and regular healthcare professional reviews are also components of asthma education (**O'Connor et al., 2025**).

Significance of the Study

In Egypt, the prevalence of asthma among school children in the Nile Delta region is about 7.7%. Asthma is relatively common in Egypt, and probably under diagnosed and under treated, particularly among children from less wealthy families (**Magzoub et al., 2019**). The World Health Organization (WHO) estimates that approximately 339 million people are affected by asthma. As the Global Initiative for Asthma (GINA) reports in 2020, asthma affects 1%–18% of populations in different countries (**Global Initiative for Asthma, 2021**).

Asthma affects 300 million persons worldwide and may increase to 400 million persons worldwide by 2025. Bronchial asthma leads to 250,000 death cases every year. That is a great socioeconomic challenge around the world. The prevalence of asthma and allergies increases in developed and developing countries (**Mohammed et al., 2020**).

Aim of the Study:

The current study aimed to evaluate the impact of educational program regarding bronchial asthma of children on caregivers' knowledge and practices.

Research Hypotheses:

To fulfill the aim of the current study the following research hypotheses were tested:

- **H1** Caregivers who receive the educational program regarding bronchial asthma of children will have higher level of knowledge than before implementation.
- **H2** Children who receive the educational program regarding bronchial asthma will have higher level of reported practice than before implementation.

Research design:

A quasi-experimental research design (One-group pretest–posttest design) was utilized to meet the aim of this study.

Setting:

The current study was conducted in the outpatient chest clinic at Minia University Hospital for Gynecology.

Sample:

A Purposive sample of 60 caregivers of children with bronchial asthma attending the pediatric outpatient clinics for 6 months at Mina University Hospital for Gynecology, Obstetrics and pediatrics fulfilling the inclusion criteria of this study participated in the study.

Inclusion criteria:

- Caregiver of children with bronchial asthma
- School aged children between 6 and 12years.

Exclusion criteria:

- Cystic fibrosis.
- Respiratory infections.
- Complicated heart failure.
- Congenital heart disease.

Data collection tools

Considering the aim of the current study, two tools were used for data collection as follow:

Tool (I): Structured interview questionnaire:

It was developed by the researcher after reviewing of related recent literature.

It involved (36) questions & classified into 5 parts

Part (1): Socio-demographic characteristics of the caregiver consist of (7) items as gender, age, educational level, family type, smokers in the family (passive smoking) ,active smoking, place of residence.

Part (2): Socio-demographic characteristics of the children consists of (4) items as child code number, child's age, gender, grade.

Part (3): Past medical data of the child include (3) items as duration of disease, recurrence of attack if yes number of recurrence during the last month, positive family history of bronchial asthma.

Part (4): Current medical data of the child include (9) items as symptoms of asthma , medications taken, frequency of attack, duration of illness, severity of attack, seasonal variation of attack, precipitating factors, medications used for treatment of bronchial asthma and time of beginning attack.

Part (5): Caregivers' knowledge regarding bronchial asthma in children consists

of (13) items: definition, risk factors, manifestations, management, complications, symptoms associated with asthma, bronchial asthma treatment, does bronchial asthma cause death , how to prevent bronchial asthma, preferable position to place a child with bronchial asthma , the effect of bronchial asthma on the development of the child, during which season of the year does bronchial asthma increase, factors that help in bronchial asthma.

Knowledge scoring system: - The score 2 was given for (correct and complete answer), the score 1 was given for (correct and incomplete answer), and score zero was given for (Don't know and incorrect answer). The scores were converted to a percent score, which was transferred into categories as follow; total knowledge score of less than 50% was considered as unsatisfactory, while score of 50% and more were considered as satisfactory.

Tool (II): Reported practices of the caregivers and their children regarding bronchial asthma

- **Reported practices of the caregivers regarding bronchial asthma:** it was used to assess caregivers' practices related to bronchial asthma. It was classified into therapeutic management, steps to avoid allergens, modifying the environment, avoiding exposing a sensitive child to excessive cold, wind, and other extremes of weather, avoiding exposure to smoke, avoiding exposure to sprays, avoiding exposure to Pets.
- **Reported practices of the children regarding bronchial asthma:** were used to assess child practices related to bronchial asthma. It was classified into steps of using metered dose inhaler and exercise.
- **Reported Practices scoring system.** Not done or done incorrect scored as (zero), done correct and incomplete scored as (1) and done correct and complete scored as (2). The scores were summed up to give the total score, after that the score was converted into percent score ,which was transferred into categories as follow: The level of practices is classified as total practice score of less than 50% considered as unsatisfactory, while score of 50% and more is considered as a satisfactory level of practice.

Validity and Reliability

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Validity

Five experts in pediatric nursing assessed the content validity of the data collection tool. Modifications to the tools were done according to the experts' judgment on the clarity of sentences, appropriateness of content, and sequence of items.

Reliability

Reliability of the tools was performed to confirm the consistency of the tools. The internal consistency was measured to identify the extent to which the items of the tools measured the same concept and correlated with each other by Cronbach's alpha test that revealed good internal reliability for the tools; and distributed as follows:

Tool	Cronbach's alpha
Tool I: Structured interview questionnaire about caregivers' knowledge regarding to bronchial asthma	0.70
Tool (II): caregivers' self-reported practices regarding bronchial asthma	0.80

Ethical considerations

An initial written primary consent was obtained from the research ethics committee affiliated to the Faculty of Nursing at Minia University. Before the conduction of the pilot study as well as the actual study, an official permission and consent were obtained from the dean of the Faculty of Nursing, as well as the Director of Minia University Hospital for Gynecology, Obstetrics and pediatrics. Written consent was obtained from caregivers that are willing to participate in the study, after explaining the nature and purpose of the study. The caregivers have the right to refuse to participate and or withdraw from the study without any rational any time. The caregiver's privacy was considered during collection of data. No health hazards were present. Caregivers were assured that all their data are highly confidential; anonymity was also assured through assigning a number for each nurse instead of names to protect their privacy.

Pilot Study

After having the ethical approval and permission to access the hospital, a pilot study was conducted on a sample of 10% (6) caregivers who met the inclusion criteria, to ensure the feasibility, objectivity, applicability, clarity, adequacy, content validity, and internal consistency of the study tools

and to determine possible problems in the methodological approach of the tools. The results of the pilot study were used to test the proposed statistical and data analysis methods. The tools were completed without difficulty, adding support to the validity of the tools, little modification was done, e.g., rephrasing and rearrangement of some sentences, the time required for completion of the interview questionnaire didn't exceed 30 minutes. Caregivers involved in the pilot study were included in the main study sample.

Data Collection Procedure

Primary approval was obtained from the research ethical committee, faculty of nursing, Minia University. An official permission was obtained from director of the hospital, and permission from the head of the pediatrics department after explaining the aim and the nature of the study. The researcher reviewed current and past, local and international related literature and theoretical knowledge of various aspects of the study using books, articles, journals, and internet to prepare the tools of data collection, then determined a suitable time to collect the data and confirm days and times suitable to conduct the study. Written consent was taken from all caregivers to participate in the study. After that, the researcher met the caregivers and arranged with them for completing the study tools. Data were coded and analyzed to answer the research questions.

Children with asthma were interviewed on an individual basis to explain the nature and purpose of the study. The researcher also explained the questions in the sheet. Measures were taken to protect caregivers' ethical rights. Caregivers' knowledge, reported practices and children's reported practices regarding bronchial asthma was assessed using the structured interview questionnaire.

-The time of beginning of data collection from 1\10\2023 to 31\3\2024

Description of the educational program:

The educational program was designed in Arabic form of an educational brochure by the researcher based upon the actual need assessment of caregivers and their children. It was also supplemented with information based on review of relevant literature. The educational program was explained through seven educational sessions for caregivers; aided by the using of illustrated Arabic booklet, educational materials that may have a positive impact on caregivers' knowledge, reported

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practice and their children reported practice, the educational sessions were designed and planned to be followed before, during and after the outpatient clinic visit.

The educational program:

The proposed program was conducted through the following phases:

1. Assessment phase:

The researcher visited the previously mentioned study setting one day / week, introduced herself, and explained the study aim. The expected outcomes were explained to the caregivers. Each caregiver was interviewed individually after obtaining informal consent to contribute to the study. The researcher collected the demographic data, assessed caregivers' knowledge and practices about bronchial asthma (Tool 1).

2. Planning (preparatory phase):

The planning phase included the program strategy time, number of sessions, teaching methods, and the media. In addition, the teaching place and the program facilities were checked for appropriateness. The number of sessions were 7 sessions, two sessions every week; the duration of each session was 30-45 minutes. Teaching sessions of the program were conducted at Minia University Hospital for Gynecology obstetric and pediatric (MUHGOP).

Program teaching methods:

A variety of teaching methods were included: lectures, group discussion, feedback, sharing experience of the caregivers were utilized in this program.

3. Implementation of the program.

Written acceptance for participation was obtained from the caregivers. The program was implemented for subgroups, Each subgroup

contains 3-5 caregivers. The same program was implemented for each subgroup of children. The program was carried out within about "six" months.

The program content was as follows:

1st Session: Included introduction about the program (purpose, session's time, session's content, and effect on child's condition). **2nd Session:** Consisted of introduction and information about bronchial asthma (definition, etiological factors as genetic factors, risk factors, signs and symptoms, and treatment). **3rd Session:** Involved aimed at providing information about severity, signs and symptoms. **4th Session:** Involved information about asthma attacks, triggers, complications. **5th Session:** Involved aimed at providing information about general management of asthma. **6th Session:** Involved information about using metered dose inhaler, exercise and steps to avoid allergens. **7th Session:** Psychological support.

4. Evaluation of the effect of the program:

Caregivers' assessment was done two times using the same study tools to investigate whether the change persisted or not. One assessment was done before the program, another one after one month of the program implementation.

Statistical analysis:

The collected data were tabulated & statistically analyzed using a software program and statistical package for social science (SPSS 23). The statistical analysis included percentage (%), mean, standard deviation (SD). Fisher's exact test is used to detect differences between more than two variables and the sample size is small. Graphs were done for data visualization using Microsoft Excel. The Correlation test and P - value of ≤ 0.05 indicates a significant result, while the P- value of > 0.05 indicates a non-significant result.

Results

Table (1) Socio-demographic characteristics of the studied caregivers (n=60):

Socio-demographic characteristics	studied Caregiver (n=60)	
	N	%
Caregiver's age/years:		
20<30 years	18	30.0
30<40 years	28	46.7
>40years	14	23.3
Age (mean±SD)	34.8±8.09	
Caregiver's education:		
Read and write	17	28.3
Primary	6	10.0
Secondary	25	41.7
University or higher	12	20.0
Family type		

Socio-demographic characteristics	studied Caregiver (n=60)	
	N	%
Nuclear	32	53.3
Extended	28	46.7
Passive smoking		
No	13	56.5
Yes	10	43.5
Active smoking		
No	60	100
Yes	0	0

Table (1): shows that 46.7% of the studied caregivers, their age ranged between 30 to < 40 years with mean 34.8 ± 8.09 years, 41.7% of them had secondary school, and 53.3% of them lived in nuclear family. Regarding smoking in house, 56.5% of caregivers reported that presence of passive smoking in house while 100% of them said there was no active smoking in the house

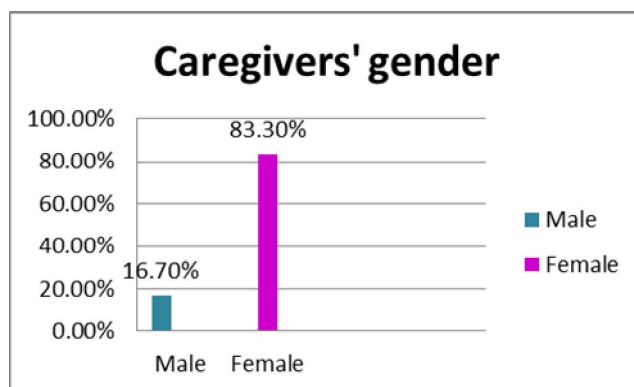


Figure (1) percentage distribution of the studied caregivers according to their gender (n=60):
Figure (1) illustrates that 83.3% of caregivers were female while 16.7% were male.

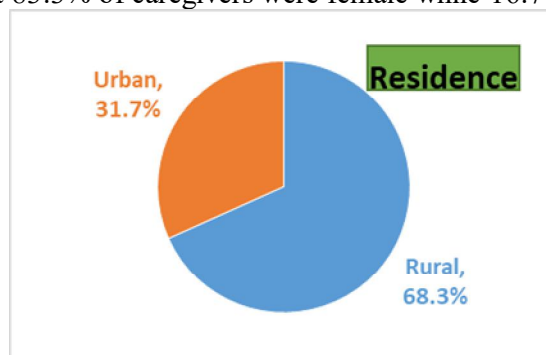


Figure (2) percentage distribution of the studied caregivers according to their residence (n=60):

Figure (2) indicates that 68.3% of caregivers came from rural areas while 31.7% came from urban areas.

Table (2) Demographic characteristics of the studied children (n=60):

Demographic characteristics	Studied children (n=60)	
	N	%
Child's age:		
6<8 years	29	48.3
8<10 years	9	15
10-12 years	22	36.7
Age (Mean ±SD)	8.3±2.38	
Child's gender:		
Male	30	50
Female	30	50
Child ranking in the family:		
The First	20	33.3

Demographic characteristics	Studied children (n=60)	
	N	%
The second	14	23.3
The third	13	21.7
The fourth or more	13	21.7
Duration of disease:-		
>1 year	33	55
<1year	27	45
Positive family history of bronchial asthma		
No	17	28.3
Yes	43	71.7
Frequency of previous attacks:-		
No	8	13.3
Once	10	16.7
Two Times	11	18.3
Three Times	4	6.7
Four Times	19	31.7
Five Times	8	13.3

Table (2) reveals that 48.3 % of studied children their age ranged from 6<8 years , 50% of them were male, 33.3% of them were the first in their rank in family and 55% of them duration of disease was>1 year , 71.7% had positive family history with bronchial asthma and 31.7% of them had four times previous attacks.

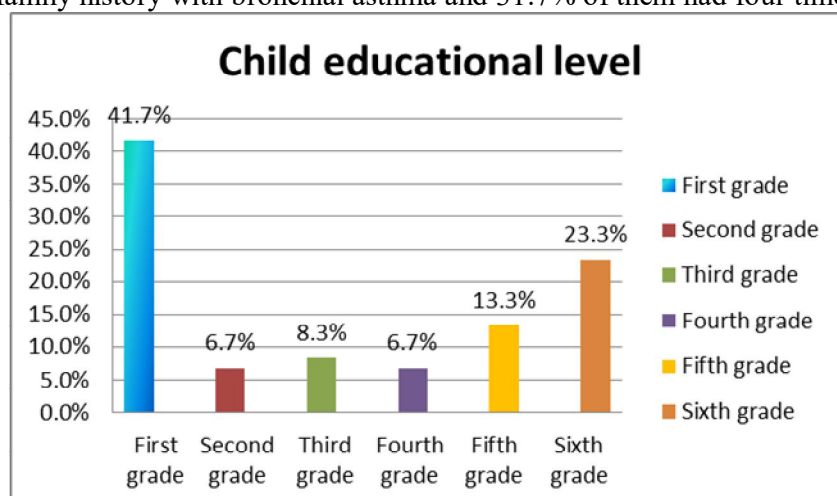


Figure (3) percentage distribution of the studied children according to their educational level (n=60):

Figure (3) shows that(41.7% , 23.3% ,13.3%, 8.3%,6.7%) of studied children enrolled in the first, sixth , fifth , third, second and fourth grade respectively

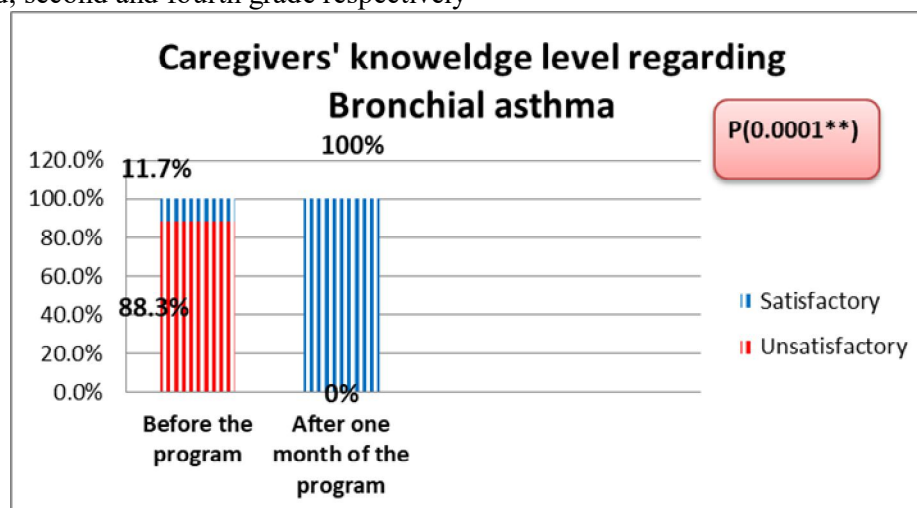


Figure (4): Percentage distribution of the studied caregivers according to their total knowledge level regarding bronchial asthma (n = 60).

Figure (4): illustrates that 88.3% of the studied caregivers had unsatisfactory knowledge regarding bronchial asthma before the program decreased to 0.0% after one month with a highly statistically significant difference P value < 0.0001.

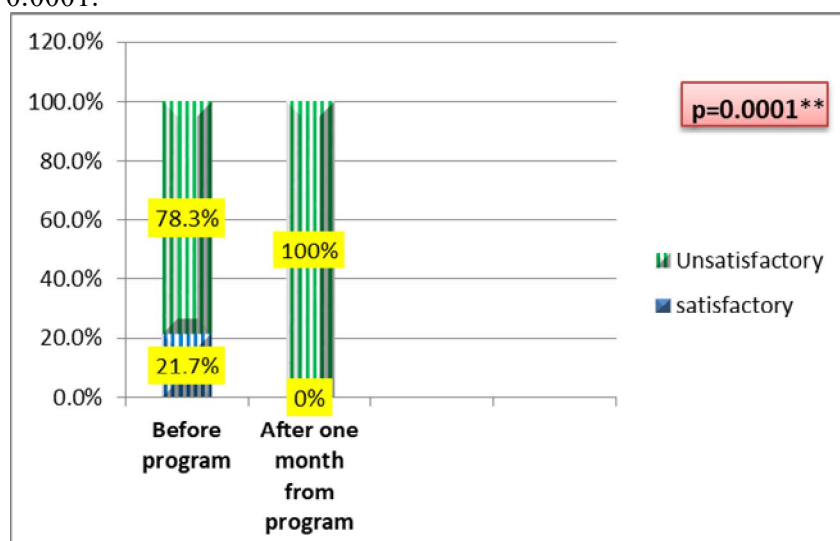


Figure (5): Percentage distribution of the studied caregivers according to their total self-reported practices level regarding bronchial asthma (n = 60).

Figure (5): illustrates that 78.3% of the studied caregivers had unsatisfactory self-reported practices level regarding bronchial asthma before the program decreased to 0.0% after one month with a highly statistically significant difference P value < 0.0001.

Table (3): Relation between total knowledge level of the studied caregivers and their demographic data before the program (n= 50).

Items	Total knowledge level before the program				Significant test	
	Unsatisfactory		Satisfactory		(X ² or Fisher test)	P value
	No.	%	No.	%		
Caregivers' age/years						
20<30 years	16	88.9	2	11.1	0.123	0.940 (NS)
30<40 years	25	89.3	3	10.7		
≥40years	12	85.7	2	14.3		
Caregivers' education						
Read or write	15	88.2	2	11.8	3.189	0.36 (NS)
Primary education	4	66.7	2	33.3		
Secondary education	23	92	2	8		
University education or higher	11	91.7	1	8.3		
Caregivers'gender						
Male	7	70	3	30	3.91	0.043*
Female	46	92	4	8		
Place of residence						
Rural	35	85.4	6	14.6	1.106	0.293 (NS)
Urban	18	94.7	1	5.3		
Family type						
Nuclear	30	93.8	2	6.2	1.95	0.162 (NS)
Extended	23	82.1	5	17.9		

Table (3): represents that no statistically significant differences between total knowledge level of the studied caregivers and their demographic data before the program except for gender, which has statistically significant differences compared to the total knowledge .

Table (4): Relation between total self-reported practices level of the studied caregivers and their demographic data before the program (n= 60).

Items	Total self-reported practices level before the program				Significant test	
	Unsatisfactory		Satisfactory		(X ² or Fisher test)	P value
	No.	%	No.	%		
Caregivers' age/years						
20<30 years	12	66.7	6	33.3	3.81	0.148 (NS)
30<40 years	25	89.3	3	10.7		
≥40years	10	71.4	4	28.6		
Caregivers' education						
Read or write	15	88.2	2	11.8	2.82	0.42 (NS)
Primary education	5	83.3	1	16.7		
Secondary education	17	68	8	32		
University education or higher	10	83.3	2	16.7		
Caregivers'gender						
Male	7	70	3	30	0.49	0.483 (NS)
Female	40	80	10	20		
Place of residence						
Rural	30	73.2	11	26.8	2.033	0.154 (NS)
Urban	17	89.5	2	10.5		
Family type						
Nuclear	26	81.2	6	18.8	0.34	0.558 (NS)
Extended	21	75	7	25		

Table (4): represents no statistically significant differences between the total self-reported practices level of the studied caregivers and their demographic data before the program.

Table (5): Correlation between total knowledge and self-reported practices scores of the studied caregivers' practices regarding bronchial asthma before and after one month of program

Items		Before the program		After one month of the program	
		Total Knowledge Scores	Total Self-reported practices Scores	Total Knowledge Scores	Total Self-reported practices Scores
Total Knowledge Scores (Before)	r		0.872*		
	p		0.021		
Total Knowledge scores (After one month)	r				0.64**
	p				0.001

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

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

Table (5): shows a positive association between the total knowledge scores of the studied caregivers and their total practices regarding bronchial asthma before and after one month of the program ($r=0.872$, P – value < 0.021 ; $r=0.64$, P – value < 0.001 respectively)

Discussion:

As regard to socio- demographic characteristics of studied caregivers, the findings of the current study showed that, almost half of the studied caregivers their age ranged between 30 – 40 years. This finding was consistent with **Alrasheedi et al., (2023)** who conducted a study titled "Awareness of asthmatic patients to the association between the environmental risk factors and asthma

exacerbation in Al-Qassim region, Saudi Arabia " they found that less than two thirds of studied caregivers aged 25 -35 years. Meanwhile, the study results disagreed with **Mohammed et al., (2023)** who conducted a study about the effect an educational program based on PRECEDE PROCEED model on mothers' performance regarding care of children with asthma and found that less than half of studied caregivers were less

than 25 years. This may be due to differences in study sample and site for the study conduct.

Regarding the education of the caregivers in the current study, fewer than half had completed secondary school, and doctors were the primary source of their knowledge. The results of a study by **Abd-Allah et al., (2020)** titled "Effect of Mobile-Based Education versus Booklet-Based Education on Mothers' Knowledge and Practice towards their Children with Bronchial Asthma" are in line with these findings. From the researcher's point of view, the source of information could influence on caregivers' knowledge. like the study conducted by **Alsayed et al., (2023)** in Saudi Arabia, which aimed to assess the level of knowledge and common practices among 393 caregivers of pediatric patients with asthma and revealed that 37.9% of them had a secondary level of education.

These findings were in line with a study conducted by **Rishi et al., (2022)** which discovered that 35.5% of the fathers and 27.5% of the mothers obtained secondary school education. The current study finding was contradicted with the study conducted by **Ali et al., (2023)** who conducted a study about the relationship between mothers' adherence to therapeutic regimen of their children with bronchial asthma and the recurrence of attacks. They revealed that more than half of mothers were presented with secondary education.

With respect to smoking indoors, over half of the caregivers in the current study reported the presence of passive smoking indoors, while 100% indicated that active smoking does not occur indoors. These findings align with those of **Khayat et al., (2021)** in a study titled "Risk factors of asthma among the Saudi pediatric population between 1 and 15 years old", another study conducted in Riyadh reported a similar finding, indicating that 86.1% of participants thought smoking near a child with asthma is harmful **Al-Zalabani& Almotairy (2020)**.

Concerning the traits of caregivers and their children examined in this study, over half resided in rural regions. The findings align with those of **Mohamed et al., (2022)** in the study titled "Mothers' Knowledge and Practice regarding Bronchial Asthma among Pre-school children," which clarified that over half, specifically more than two-thirds, of mothers were residing in rural areas.

In terms of the socio-demographic characteristics of the asthmatic children studied, half were male. These findings align with those of **Hashim et al., (2022)**, who reported a similar

gender distribution in his study titled "Knowledge and Self-Care Management Practice Among Asthmatic Children (6–12 Years): An Educational Intervention Study." Meanwhile the study results disagreed with **Aziz et al., (2022)** who conducted a study about "Knowledge, Attitude and Practice of Parents of Children with Childhood Asthma in a Tertiary Care Hospital" who found that; there were 63 (57.3%) males and 47 (42.7%) females, with a male-to-female ratio of 1.34:1 (slightly male predominance).

In terms of children's demographic information, medical history, and health status, the current study found that over one-third were the first-born in their families. These findings are consistent with those of **El-Zayat & El Awady (2020)** in Helwan, Governorate, Egypt, who examined "Mobile Learning Package for Mothers about Bronchial Asthma of their Children."

Regarding family history of bronchial asthma, which is one of the common risk factors for developing children's bronchial asthma. The present study described that more than two quarters of children with bronchial asthma had a positive family history. **This finding demonstrates the fact that** bronchial asthma is a hereditary disease (**Cevhertas et al., (2020)**). These findings are corresponded with **Ali et al., (2023)** which found that; more than half of children (54.0%) had a family history of bronchial asthma.

Concerning the intensity and severity of asthma attacks, the current study revealed that more than half of the participants experienced attacks classified as moderate to intermittent. This aligns with the findings of **Ghonem (2022)**, who investigated the prevalence of bronchial asthma among 2,763 school children in El Menoufiya Governorate, Egypt, and reported that nearly half (49.1%) of the 89 asthmatic children had intermittent asthma. Meanwhile, the study results disagreed with **ELDIN et al., (2021)** who conducted a study about "asthma education and its impact on emergency department visits by asthmatic children" who found that; (10%) of the patients were diagnosed as having intermittent asthma and (16.7%) were diagnosed as mild persistent asthma and (37.7%) were with moderate persistent asthma, whereas (37.7%) had severe persistent asthma. This may be due to differences in study sample and site for the study conduct.

A systematic review by **Nyaga et al., (2025)** affirmed that caregivers' knowledge of asthma was associated with favorable childhood asthma outcomes. More specifically, caregivers

with better knowledge about the disease reported better symptom management, adherence to medication instructions, correct inhaler use technique, reduced hospital visits, and fewer re-hospitalizations. Comparably, **Omara et al., (2023)** declared that the educational intervention improved asthma control dramatically, including daytime asthma symptoms, night awakenings, and frequency of use of short-acting beta2- adrenergic receptor agonists. Furthermore, the number of emergency department visits and hospitalizations fell considerably after the intervention ($p < 0.001$ for all). Asthma education was also linked to better inhalation technique and lung function ($p < 0.001$). Furthermore, all quality-of-life measures increased ($p < 0.001$ for all).

Similarly, **Ali et al., (2021)**, in their study on the "Asthma Education and its Impact on Emergency Department Visits by Asthmatic Children," they reported that asthma education was associated with less emergency room (ER) visits, and better identification of the signs of a severe asthma attack. A recent study in Madinah City, Saudi Arabia has shown statistically significant differences where hospitalization and PICU admission have markedly reduced among the post-education groups **Alhazmi et al., (2023)**. **From the researcher's point of view;** the effectiveness of an educational program about caregivers' knowledge leads to a reduction in emergency room visits and severity of asthma attacks.

Concerning caregivers' knowledge about bronchial asthma, the current findings of the present study revealed a highly statistically significant improvement across all knowledge domains after one month of implementing the educational program, compared to the pre-intervention phase ($p < 0.0001$). These results are in agreement with those of **Hassan et al., (2022)**, who also reported a significant increase in caregivers' overall knowledge about asthma in both posttest and follow-up assessments compared to the pretest.

Regarding overall caregivers' knowledge and reported practices, the current study found a highly statistically significant positive correlation between caregivers' knowledge and their self-reported practices related to bronchial asthma, both before and one month after the educational program. This aligns with the findings of **Silvia et al., (2022)**, whose study titled "Parental Knowledge, Attitude Toward Asthma, and Its Correlation with Compliance of Asthma Management in Children" reported that most parents (87.0%) had moderate knowledge and

82.0% demonstrated good practices following program implementation.

Similarly, **El Nady et al., (2024)** studied the effect of an interventional health educational program on clinical improvement in a sample of Egyptian school-age asthmatic children and stated that health educational programs should be conducted to Egyptian asthmatic children, their parents, and their caregivers because caregivers of asthmatic children suffer from many challenges and can be strongly affected by their child's disease, so the preventive measures, early diagnosis and the appropriate management of asthma should be well known for the asthmatic child caregiver.

In this study, the caregivers' level of asthma knowledge was significantly associated with their history of previous asthma education, which aligns with the findings of **Ali et al., (2022)**. Additionally, the accuracy of inhaler technique showed significant positive correlations with factors such as the child's age, place of residence, caregivers' education level, prior asthma education, and adherence to treatment during the pre-intervention phase. The findings contrast with those of **Cinar et al., (2021)**, who found no significant relationship between parents' educational level and inhaler technique accuracy. This discrepancy might be explained by a generally high level of caregiver awareness, regardless of formal education.

While this result was contradicted by **Castilho et al., (2020)** who conducted the study about "Effects of inspiratory muscle training and breathing exercises in children with asthma" who found that the studies included in this review did not use breathing exercises: they were one element of a more complex intervention protocol, including aerobic exercises, muscle relaxation, disease education, among other interventions. Therefore, the real effects of each resource or technique of the respiratory physiotherapy could not be identified and isolated.

With regard to caregivers' self-reported practices, the current study observed a significant improvement in therapeutic asthma management one month after the intervention—particularly in areas such as regular visits to healthcare providers, prevention of exacerbations, and adherence to medication—with highly statistically significant differences ($p = 0.0001$). Recent research also highlights that when healthcare providers integrate asthma education into their care routines, it leads to better asthma management and improved patient outcomes. For instance, a study found that patients whose healthcare providers participated in asthma

care education programs experienced a greater reduction in asthma symptoms and fewer emergency department visits compared to those who did not receive such education (**Gebresilassie et al., 2025**).

The current study found that more than two-quarters of participants had a positive family history of bronchial asthma. This finding contrasts with previous studies, including that of **Akinso et al., (2023)**, which reported that the majority of respondents did not have a family history of asthma. Earlier clinical research similarly indicated a lower prevalence of familial asthma history among participants, highlighting a discrepancy between the current study and prior findings.

In the current study, caregivers demonstrated the highest levels of knowledge regarding asthma triggers in their children. Additionally, knowledge related to diagnosis and treatment improved significantly, with more than half of caregivers answering correctly before the educational program and over three-quarters doing so after the intervention. These findings are consistent with those of **Jordan et al., (2022)**, who reported increased caregiver knowledge concerning asthma symptoms and the nature of the disease, with improvements observed from half to slightly more than half following an educational program. Similarly, the results align with **Akinso et al., (2023)**, who found that caregivers showed a strong understanding of asthma triggers and recognized the importance of using controller medications. **This improvement indicated** the effectiveness of the health education provided, as it significantly enhanced the caregivers' knowledge of ward bronchial asthma.

The current study indicated that there were no statistically significant differences between the total knowledge levels of the caregivers and their demographic characteristics before the educational program. These findings disagree with those reported by **Sheha et al., (2023)**, who found a statistically significant relationship between children's post-intervention practice scores and both their gender and their parents' educational levels. Additionally, a significant association was observed between students' post-intervention knowledge scores and their parents' education. Similarly, **Ebrahim et al., (2020)** reported a significant difference relationship between children's knowledge and factors such as gender and mothers' education levels.

These results also contradict by **Silvia & Soundararajan, 2022** who demonstrated that there

was a significant association between educational status and satisfactory knowledge ($P = 0.044$) and good practices ($P = 0.017$). Baseline global ability was positively correlated to female gender, younger age, previous pulmonary rehabilitation access, outpatient status, higher education level **vitacca et al., (2023)**. **From the researcher's point of view**, the children who are older are more likely to be aware of the application and apply knowledge of asthma control and educated caregivers are more expected to be aware of asthma control measurement and to apply it to their children than uneducated caregivers.

Conclusion:

The current study results concluded that , the vast majority of studied caregivers in the study had unsatisfactory level of knowledge and self-reported practices level regarding bronchial asthma before the program, one month after the program's implementation, all caregivers demonstrated satisfactory levels of both knowledge and self-reported practices with highly statistically significant difference (P value < 0.0001). There was a positive association between the total knowledge scores and their total practices scores related to bronchial asthma after one month of the program ($r=0.872$, P – value < 0.021 ; $r=0.64$, P – value < 0.001 respectively).

Recommendations:

Based on the findings of the current study, the following recommendations were suggested:

1. Regular asthma education should be integrated into pediatric care services.
2. Developing culturally sensitive educational materials. And actively involve school nurses and community health workers in ongoing asthma awareness campaigns.
3. Developing culturally appropriate, easy-to-understand educational materials.
4. Encouraging school-based asthma programs for both students and parents.
5. Long-term follow-up studies should be conducted to assess sustained outcomes.
6. **Health Policy:** Incorporate mandatory asthma education for caregivers during pediatric visits.
7. **Clinical Practice:** Use videos, charts, and leaflets to reinforce learning.
8. **Community Outreach:** Engage school health workers and local clinics to provide decentralized asthma education.

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9. **Further Research:** conduct longitudinal studies to measure retention of knowledge and sustained behavioral change over time...etc.
10. Periodical follow-ups should be carried out to assess the health status of children with bronchial asthma and their mothers' level of knowledge and practices.

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