

Effect of Educational Program Based on PRECEDE PROCEED Model on Mothers' Performance Regarding Care of Children with Asthma

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Abstract

Background: Bronchial asthma is one of the most common chronic diseases among children and adolescents. Parents have an essential role in management of children's with asthma. Therefore, mothers should gain large knowledge that enable them to identifying the risk factor particular for each child and bypass them as a strategy for secondary prevention to control asthma attacks. **The aim of the study:** to evaluate the effect of the educational program based on PRECEDE – PROCEED model application on mothers' performance regarding care of their children with asthma. **Research design:** A quasi-experimental (pre/post-test) design. **Setting:** The current study was conducted in Pediatric Medical Departments at Benha University Hospital. **Tools of data collection: Tool (I): A structured interview Precede questionnaire sheet.** This instrument was divided into four parts: **Part (1):** Personal characteristics of the mothers, **part (2):** Characteristic of the children, **part (3):** Medical history of studied children and **part (4):** Asthma characteristics of the studied children and their sensitivity. **Tool (II): Assessment sheet for predisposing factors.** It was divided into three parts. **Part (1):** Mothers' knowledge about asthma and its treatment, **part (2):** Mothers' reported practice regarding care of children with asthma, **part (3):** Mothers' attitude toward children with asthma. **Tool (III): Reinforcement factors assessment Sheet. Tool (IV): Enabling factors assessment Sheet. Results:** there was a highly statistically significant positive correlation between total mothers' knowledge, reported practice, reinforcing, enabling factors, and attitude according to care of their children suffering from bronchial asthma thorough Precede Proceed phases ($P < 0.001$). **Conclusion:** Based on the result of the current study, it was concluded that, the educational program based on PRECEDE-PROCEED Model is an effective method in planning and providing health education to improve mothers' knowledge, reported practices and attitudes regarding care of their children with asthma and promoting enabling and reinforcing factors that support prevention and control trigger of asthma among them. **Recommendation:** Educational training programs about asthma should be conducted at primary health care settings and hospitals for parents to understand and know how to deal with asthma as a chronic disease in order to overcome challenges of asthma control.

Key Words: PRECEDE-PROCEED Model, Mothers Performance, Bronchial Asthma, Children, Educational Program

Introduction

Asthma is defined as a chronic and inflammatory respiratory condition in the early years of life. It mainly affects the bronchial airways, causing significant inflammation, increasing airway sensitivity to allergens. Uncontrolled asthma has been correlated with an increased incidence of hospital admissions, reduced quality of life, and increased morbidity and mortality. The typical clinical manifestations for asthma appear in the form of breathlessness, coughing, chest tightness, and wheezing. These symptoms are particularly prevalent during early morning and at night. It can also worsen in some seasons, such as spring and autumn, due to increased pollination at this time of the year. There is a wide variation among asthmatic children in the severity of their symptoms. Accordingly, asthma symptoms can resolve spontaneously, or require treatment (Mohammed et al., 2021).

Bronchial asthma in children usually has several causes, or triggers. These triggers may not be the same for each child and often have more than one trigger. Asthma triggers change with a child ages, child's reaction to a trigger and treatment. Asthma trigger factors are

classified as follows; genetic , environmental factors which may be indoor or outdoor allergens, respiratory infection, diet and drugs allergy, psychological factors, gastro esophageal reflux disease, weather and endocrine factors (Chhaya et al., 2020). Asthma management including; monitoring, control of symptoms and the prevention of exacerbations. Mothers are the primary source in promoting their children's health, giving direct care, providing access to health services. Improving practices and behaviors of mothers that influence their children's well-being (Rekha & Padmaja, 2018).

Mothers have an essential role in treating of their children's with asthma and responsible for looking after their young children's environment, treatment .In older children, mothers should supervise their children's surrounding and attitude and compliance to treatment (Mohammed, 2020). Mothers with inadequate knowledge may not recognize the symptoms, leading to delay or inadequate treatment and follow-up. Mothers are the main caregivers of children, increasing their awareness and changing their attitudes and practices toward asthma would lead to better outcomes (Silvia et al., 2022).

PRECEDE model is a design framework and model to identify needs in health education and health promotion. This model is a process for changing behavior and evaluates the possible outcomes of a training program. The PRECEDE model consists of predisposing factors, reinforcing, and enabling constructs in educational and environmental diagnosis and evaluation. The predisposing factors include; parameters, such as knowledge, attitude, beliefs and some demographic characteristics that facilitate or control specific behaviors. Reinforcing factors include social support, peer groups, family members, health care providers, and people important to an individual. The enabling factors facilitate or inhibit environmental and behavioral changes that affect individual behavior. Parameters related to enabling factors include health care programs, as well as access to medical services and required resources. Reinforcing factors are defined as feedback generated by others after a particular behavior that can promote or weaken the continuity of the behavior. Identification and modification of these factors in educational programs can significantly affect the change or development of behavior (Mina et al., 2017).⁽⁶⁾

In health education and health promotion, a number of a logic models were used and one of the most frequently used is the PRECEDE-PROCEED Model. When a problem affecting children has been identified, health and the health professional must do something to fix the problem, a planning model like PRECEDE-PROCEED, which has been the cornerstone of health promotion practice for more than three decades, can help guide this process. This model prescribes eight phases in planning, implementing, and evaluating health promotion programs. The PRECEDE portion of the model (Phases 1-4) includes social, epidemiological, behavioral, environmental, educational, administrative, and policy assessments. The PROCEED portion of the model (Phases 5-8) includes implementation, process evaluation, impact evaluation, and outcome evaluation. The first portion of the model focuses on program planning and the second portion focuses on implementation and evaluation (Kim et al., 2022).⁽⁷⁾

Significance of the study :

Asthma is the greatest common chronic illnesses among children and it considered a significant comorbid disease. Asthma considers a significant health problem throughout the world. Bronchial asthma is affecting 10% to 15% of children worldwide, and affects an estimated 300 million individuals worldwide with an expected increase to 400 million worldwide by 2030. In addition, 250,000 asthma deaths are reported worldwide and approximately 500,000 annual hospitalizations are due to asthma (Yasuaki et al., 2021).⁽⁸⁾ Bronchial asthma is the most prevalent chronic disease of childhood. Asthma constitutes serious public health problem, the incidence and severity of asthma are increasing all over the world . The prevalence of bronchial asthma among Egyptian children aged 3-10 years was estimated between 7.7% in Nile Delta to 9.4% in Cairo. Current asthma prevalence is higher for

children than for adults. The burden of the uncontrolled asthma is high, which needs frequent emergency room visits and hospital admissions (Mohamed et al., 2020). So, The aim of the study to evaluate effects of educational program based on PRECEDE-PROCEED model on mothers' performance regarding care of children with asthma

Aim of the study:

The aim of the current study was to evaluate the effect of the PRECEDE – PROCEED model application on mothers' performance regarding care of children with asthma, through the following:-

1. Assessing mothers' knowledge , reported practice and attitude regarding care of children with asthma.
2. Designing educational program based on PRECEDE – PROCEED model implementation to improve mothers' knowledge, reported practice and attitude regarding care of children with asthma.
3. Evaluate the effect of educational program based on PRECEDE– PROCEED model implementation to improve mothers' knowledge, attitude and reported practice regarding care of children with asthma.

Research Hypothesis

Hypothesis (1): Mothers receiving educational program based on the PRECEDE- PROCEED model will expected to improve knowledge , reported practice and attitude regarding care of children with asthma posttest more than pretest.

Subject and Methods

I. Technical design:

The technical design for the study includes research design, setting, subject and tools for data collection.

Study Design

A quasi-experimental research design was utilized for conducting the study.

Setting:

The current study was conducted at Pediatric Medical Departments at Benha University Hospital in Benha city. It located at the fourth floor and consists of two units, first unit contains three rooms, each room contains 5 beds, the second unit contains 2 rooms and each room contains 5 beds.

Subject of the Study

A purposive sample of (50) mothers accompanying their children suffering from bronchial asthma attending the above mentioned setting after fulfilling the following criteria.

Inclusion criteria:

- Mothers' had children with bronchial asthma and their age ranged from 6-14 years old.
- Mothers' had children conscious and able to communicate.
- Mothers' willing to participate in the study.
- Free from other chronic illness or psychological problems.

Data collection instruments: Precede-Proceed model constructs:

To achieve the aim of the study, four instruments were utilized for data collection

Tool (I): A structured interview Precede questionnaire sheet. It was developed by the researchers after reviewing related literature. This instrument was divided into four parts:

Part (1): Personal characteristics of the mothers: age, educational level, occupation, number of family members and residence, parent socioeconomic status, household overcrowding and sources of mothers' information.

Part (2): Characteristic of the children: It was gather through individual interviewing with mothers accompanying their children such as child age, gender, educational level and ranking.

Part (3): Present Medical history of studied children: such as age of the child at diagnosis, onset of disease, family history of bronchial asthma, disease duration, number of previous hospitalization, and causes of previous hospitalization and duration of follow up. The researchers collected medical data of studied children from the medical record.

Part (4): Asthma characteristics of the studied children and their Sensitivity: such as manifestations of bronchial asthma, time of child complaints from asthma, symptoms felt by child during asthma attack, seasonal occurrence of attack, child suffers from sensitivity, factors of asthma triggering and average occurrence of attack during a month.

Tool (II): Predisposing Factors Assessment Sheet. This part divided into three parts.

Part (1): Mothers' knowledge about Asthma and its treatment. It was designed by the researchers based on **Sommanus et al., (2022)⁽⁹⁾**, to assess mothers' knowledge regarding bronchial asthma and written in the form of multiple choice questions. It consisted of (4) parts and 17 questions:

Part (A): Mothers' knowledge about Asthma: it consisted of (8) items such as (meaning, risk factors, mechanisms of bronchial asthma, symptoms, triggers of childhood asthma, average length of attack, the day time that attack occurs, complications of asthma).

Part (B): Mothers' knowledge about treatment of asthma, it consisted of (5) items such as (name, type of child's medication, regularity for giving medication, treatment of asthma and emergency treatment of asthma).

Part (C): Mothers' knowledge about methods of prevention and management of asthma, it consisted of (2) items such as (methods of prevention from asthma and management of childhood Asthma).

Part (D): Mothers' knowledge about nutrition, it consisted of (2) items such as (food should be avoided, healthy food should be intake).

Scoring System

Studied mothers answered were compared with model key answers; where scored as complete and correct answer had score (2), incomplete correct answer had score (1) and incorrect or unknown had scored (0). Total knowledge scores ranged from (0- 34) points. In this respect the level of mothers' knowledge was categorized as the following: poor level of knowledge (< 50%) was ranged from (0 <17) points, moderate level of knowledge (<50-75%) was ranged from (17 <25.5) and Good level of knowledge ($\geq 75\%$) was (≥ 25.5) points.

- Poor level of knowledge (< 50%)
- Moderate level of knowledge (<50-75%)
- Good level of knowledge ($\geq 75\%$)

Part (2): Mothers' reported practice regarding care of children with asthma

It was designed by the researchers based on **Fasola et al., (2020)⁽¹⁰⁾**, to assess mothers reported practice regarding care of children with asthma. It contained of 85 items grouped under eight domain that included: Medication administration(12) steps, nutrition(10) steps, chest exercise (11)steps, mouth care(13) steps, care of child during asthma attacks(15)steps, prevention of asthma attacks(8) steps, technique of nebulizer usage(7) steps and precaution of nebulizer usage(9) steps.

Total scoring system:

The scoring system consisted of two points: done complete and correct was scored (1), not done was scored (0). The total scores were ranged from (0 to 85) points. Accordingly, the level of mothers' reported practices was categorized as the following, satisfactory level (≥ 42 point) and unsatisfactory level (<42 point) and classified into 2 categories as following:

- Satisfactory level ($\geq 60\%$).
- Unsatisfactory level (<60%).

Part (3): Mothers' attitude toward children with asthma

It adapted from **Noureddin et al., (2019)⁽¹¹⁾**, to assess mothers' attitude toward children with asthma. It consisted of 24 items such as (usage inhalational medications, important to consult the treating doctor,

inhalational therapy has been useful in improving quality of life, exercise and sports can be inducing asthma and children are embarrassed about using their inhalers in school class).

Scoring System:

The mothers response was classified into a 5-point Likert scale, strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5). Total scores were ranged from (0- 120) points, so the level of mothers attitude was categorized as the following, positive attitude was ranged from (60-120) points and negative attitude (less than 60) point.

- **Positive attitude level** ($\geq 60\%$).
- **Negative attitude level** ($< 60\%$).

Tool (III): Reinforcement factors assessment Sheet: It adapted from **Chen et al.**⁽¹²⁾, (2022), it included (10) questions to measure the support, encouragement and the persons who reinforcing mothers for positive behavior regarding care their children with asthma such as (presence of friends support, satisfaction with friends' support, family encouragement to follow up and availability of care at the treatment facility).

Tool (IV): Enabling factors assessment Sheet: It adapted from **Ismail et al.**, (2020)⁽¹³⁾, It included 10 items to measure the availability and accessibility of resources needed to enable behavior change such as informational resources, educational classes or counseling center to educate mothers about care their children with asthma such as (participation in educational classes for mothers regarding asthma, participation in educational program regarding asthma, identify available resources and facilities for asthma prevention and management, participating in the religious ceremonies, presence of books or magazines contains information related to asthma and the hospital accessibility).

Scoring system for reinforcement and enabling factors:

Scores of each item on enabling factors and reinforcement factors of the studied mothers scored as the following No (0), Sometimes(1) and Yes(2). Total scores were ranged from (0- 40) points, so the level of mothers enabling factors and reinforcement factors was categorized as the following, strong was ranged from (20-40) points and poor (less than 20) point.

- Strong** ($\geq 60\%$)
- Weak** ($< 60\%$).

II. Operational design:

The operational design included: Preparatory phase, content validity, reliability of tool, pilot study and field work.

The preparatory phase:

This phase included reviewing the related literature and different studies related to bronchial asthma and theoretical knowledge of various aspects of the study,

using textbooks, evidence based articles, internet, periodicals and journals to develop tools and to get acquainted with the various study aspects of the research problems.

Content validity:

Tools validity was checked through a jury of three experts (Professors) of Pediatric Nursing from the Faculty of Nursing Benha University, and Cairo University, to test the content validity of the instruments and to judge its clarity, comprehensives, relevance, simplicity, and accuracy. All of their remarks were considered. Some items were rephrased to arrive at the final version of the tools. The tools were regarded as valid from the experts' point of view.

Reliability:

Reliability for tools was applied by the researchers for testing the internal consistency of the tools by administrating of the same tool to the same subjects under similar condition. Internal consistency reliability of all items of the tools was assessed using Cronbach's alpha coefficient. This turned to be (0.72.) for mothers' knowledge assessment sheet, mothers' reported practice the value was (0.88). Attitude scale confirmed with a Cronbach's alpha reliability coefficient of 0.71. The reliability of predisposing, reinforcing, and enabling questionnaires the value was (0.79).

Ethical Considerations:

Ethics approval granted from the Scientific Research Ethical Committee of Faculty of Nursing, Benha University, and an official approval was obtained from directors of the Benha University Hospital. Informed consent was obtained from the studied mothers prior to data collection. The mothers and their children were informed about the purpose and the expected outcomes of the study. Also, the mothers were assured that the study was harmless to their children, their participation was voluntary and they have the right to withdraw from the study at any time without giving any reason. Mothers were also assured that anonymity and confidentiality will be guaranteed as well, the collected data will be used for the research purpose only. The ethics, values, culture and, beliefs of the mothers and their children were respected.

Pilot study:

A pilot study was carried out involving 10% of the total subjects (5) mothers who accompanying their children with bronchial asthma and excluded from the present study to avoid sample bias and contamination since some modifications were done in the form of rephrasing for some statements. The final form of the tools was then obtained and the time needed for completing each tool was determined.

Field work:

The study was conducted through Precede-Proceed model phases. It was carried out from the beginning of December 2022 and completed at the end of May

2023 covering 6 months. The researchers were available two days /week. Data was collected during the morning times from the previously mentioned setting. To fulfill the aim of this study, the following phases were adopted assessment phase, planning phase, PRECEDE-PROCEED model implementation phase and evaluation phase.

Assessment phase

Assessment phase involved interviews with mothers and their children to collect baseline data. The researchers were visited Benha University Hospital ; two days/ weeks by rotation from 9 AM and extended to 12.30PM. At the beginning of interview; the researchers welcomed mothers, explained the purpose, duration, activity of the study and take their oral approval to participate in the study prior to data collection. This period of pretest took 4 weeks starting from beginning to the end of December 2022).

Proceeds steps included four assessment Phases:

Phase (1) Social assessment: it include assessment of the socio demographic data of mothers and their children by using **Tool I**

Phase (2) Behavioral and Environmental assessment: In this phase, the researchers assessed mothers' attitude regarding children with bronchial asthma by using **Tool II** part three.

Phase(3) Educational and ecological Assessments: In this phase, the researchers assessed the predisposing, reinforcing and enabling factors that lead to behavioral change to improve mothers performance regarding care of their children with bronchial asthma by using **Tool II, III** and **IV**.

Phase(4) Administrative and Policy Assessments: it include; polices, organizational supports and resources needed for implementation and evaluation of the program. The researchers selected the program component and priorities of change that previously identified. This was achieved by assessing the place, identifying time table, resources, budgeting, barriers, facilities, and coordination required to implement the interventions.

Planning phase:

Based on results obtained during assessment phase, the intervention program based on PRECEDE-PROCEED model was developed by the researchers after reviewing related literature in a form of printed booklet. The booklet was designed specifically for mothers, in simple Arabic language to suit their level of understanding and to satisfy the studied mother's deficit knowledge, attitude and practice regarding care of their children with bronchial asthma. It was illustrated by colored pictures. Sessions number and its contents, different methods of teaching, and instructional media were determined. Objectives were constructed to be attained after completion the intervention program.

Design of PRECEDE-PROCEED Model

General objective:

The main goal of educational program based on PRECEDE-PROCEED model to improve mothers knowledge, practice and attitude regarding care of Children with asthma

Specific objectives: At the end of educational program based on PRECEDE-PROCEED model, the mothers will be able to:

1. Define of bronchial asthma.
2. List predisposing factors for bronchial asthma.
3. Enumerate causes of trigger of asthma.
4. Illustrate mechanisms of bronchial asthma
5. Identify clinical manifestation of bronchial asthma.
6. Explain complication of bronchial asthma
7. Recognize investigation and management of bronchial asthma.
8. Identify type of treatment of bronchial asthma
9. Discuss method to prevent of bronchial asthma.
10. Explain management of bronchial asthma.

Implementation phase:

PROCEED phases had the second four step of model. This phase took three months from the beginning January 2023 to the end of March 2023.

Phase (5) Implementation phase: After planning of intervention, the educational intervention was implemented. The main objective of the educational intervention was modify predisposing factors (knowledge, practice and attitude), reinforcing factors, and enabling factors to improve mothers performance regarding care of children with bronchial asthma and achieve this. The mothers received the educational intervention in 4 sessions based on the PRECEDE-PROCEED planning model, each session lasting 45 minutes using booklet, pamphlets, questions and answers to help children better understanding of content, in addition face to face and small group discussion as follows:

The study sample included 50 mothers accompanying their children. Those mothers were divided into 10 small groups; each group included (5 mothers). According to hospital policy, the researchers held meeting session with each group and each session lasting 45 minutes. At the beginning of the first session mothers were oriented with the program contents. Each mother was informed about the time of the next sessions at the end of session. The subsequent session started by a feedback about the previous session and the objectives of the new session, using simple Arabic language to suit mothers' level of understanding. At the end of each session, mothers' questions were discussed to correct any misunderstanding. Different methods of teaching were used such as discussion, demonstration and re-demonstration. Instructional media included video contain all content of program and educational booklet about bronchial asthma which constructed by

the researchers in a simple Arabic language after reviewing the related literatures and based on mothers' deficit knowledge, attitude and practice regarding care of children with bronchial asthma.

-First session focused on providing adequate and most important knowledge about disease (Predisposing factors): mothers received brief explanations with pictures about bronchial asthma definition, risk Factors, mechanisms of bronchial asthma, symptoms, triggers of childhood Asthma, average length of attack, the day time that attack occurs, complications of asthma, name and type of child's medication, regularity for giving medication, treatment of asthma and emergency treatment of asthma methods of prevention from asthma and management of childhood asthma, healthy food should be intake and food should be avoided.

-Second session focused on changing attitude toward children with asthma

(Predisposing factors): mothers received general information supported with pictures about child will get addicted to inhalational medications and devices, important to consult the treating doctor before increasing/decreasing/stopping inhalational medications for asthma, children older than 5years no need for using mask, a child with asthma can live a normal day to day life (including routine sports and exercise), inhalational therapy has been useful in improving quality of life of my child with asthma (absence of symptoms, routine daily activities, adequate play, adequate schooling, proper study, no disturbances of sleep), asthmatic child should be give physical education classes, avoid sports activities, exposure to perfumes and incense or paint fumes that lead to acute asthma attacks and children are embarrassed about using their inhalers in school class.

-Third session was about to modify reinforcing factors through: mothers have emotional support from your family, have support from family and your health care provider in implementing asthma preventive behavior, Encouragement and the support of mothers to perform the appropriate behavior regarding control and prevention of asthma, mothers able to helps and conversation with another mothers of children with asthma to identify common causes of disease and methods of prevention of asthma among children, mothers help health care staff during care of children to identify how giving care for children during asthma attacks, facilitate conversations that can be difficult for mothers to start with their doctors and other care providers and learn others proper methods to control asthma (healthy diet, medication, exercise and avoid exposure to air allergen).

- Fourth session was about to promote enabling factors through provide information about available resources and facilities for asthma prevention and management, receive an educational program regarding asthma, educational classes for mothers regarding asthma, medication and management of trigger of asthma, giving educational pamphlets to family members of children with asthma for increasing their knowledge of asthma treatment, providing a booklet of

guidelines for improving knowledge and practice regarding care of children with asthma through holding training sessions, displaying training videos and slides.

Evaluation phase:

This phase took two months from the beginning April to the end of May 2023.

Phase (6) Process evaluation: In this study, process evaluation included evaluating the program component, methods and material used.

Phase (7) Impact evaluation: reassessment of mothers' changes in predisposing, reinforcing and enabling factors regarding care of their children with bronchial asthma immediately after intervention activities through analysis of the questionnaires and meeting with mother and their children to ensure availability of positive enabling and reinforcing factors .

Phase (8) Outcome evaluation: reassessment of mothers' performance changes in predisposing, reinforcing, and enabling factors and mothers knowledge, practice and attitude regarding care of their children with bronchial asthma (post and follow up test).

III- Administrative Design:

An official approval was taken from the Dean of the Faculty of Nursing Benha University to Rheumatology and Immunology Outpatient Clinics at Benha University Hospital in Benha city. A clear explanation was given about the nature, importance and expected outcomes of the study to carry out the study with minimal resistance.

IV- Statistical Design:

The collected data organized, tabulated and statistically analyzed using Statistical Package for Social Science (SPSS) version 21 for windows, running on IBM compatible computer. Descriptive statistics were applied (e.g. frequency, percentages, mean and standard deviation). Test of significance, Chi-square test (X^2) this test used to measure significant of qualitative variables and correlation coefficient (r) used for quantitative variables that were normally distributed or when one of the variables is qualitative. These tests were applied to test the study hypothesis. Reliability of the study tools was done using Cronbach's Alpha. A highly significant level value was considered when $p < 0.001$, a significant level value was considered when $p < 0.05$ and. No statistical significance difference was considered when $p > 0.05$.

Results

Table (1): Shows that, less than half (46.0% & 42.0%) of studied mothers were in the age group 25<30, with mean \pm SD= 30.07 \pm 4.72 years and had secondary education respectively. Also, less than three quarter (74.0%) of studied mother was living in urban areas. Meanwhile, more than half (56.0%) of them had sources of information by doctor.

Table (2): Reveals that, more than half (60.0% & 66.0%) of studied children were in the age group 8 < 12 years, with mean \pm SD= 10.32 \pm 2.18 years and were males, respectively. more than three quarters (78.0% & 76.0%) of them were preparatory school educational level and had period of disease <3 years respectively. Meanwhile, most of them (82.0%) use medications anti-histaminic and bronchodilator.

Table (3): Demonstrates that, statistically significant improvement were detected in health status of children with bronchial asthma at post and after three months than pre Precede Proceed model as decrease in frequency of asthmatic attack, moist cough, upper respiratory tract infection, difficult breathing, fatigue during any activity and fever. Moreover, there was a highly statistically significant difference at pre, post and after three months of Precedes Proceed model implementation regarding all domains of health status of children ($P < 0.001$).

Table (4): Clarifies that, more than half (66.0% & 62.0%) of the studied mothers had incorrect or unknown answer regarding mechanisms of bronchial asthma, triggers of childhood asthma, causes of asthma and average length of attack in the pre Precedes Proceed model implementation phases respectively. While, 56.0%, 64.0% and 70.0 % of them had correct complete answer regarding all items in the post and after three month of Precedes Proceed model implementation phase. Moreover, there was a highly statistically significant difference at pre, post and after three months of Precedes Proceed model implementation of mothers knowledge regarding bronchial asthma ($P < 0.001$).

Table (5): Presents that, there was a highly statistically significant difference in their mothers knowledge about methods of treatment, prevention bronchial asthma and nutrition at post and after three months of Precede Proceed phases as compared to pre of Precede Proceed phases ($P < 0.001$).

Table (6): Clarifies that, there was a highly statistically significant difference at pre, post and after three months of precedes proceed model implementation regarding care of children with bronchial asthma ($P < 0.001$).

Table (7): Clarifies that, there was a highly statistically significant positive correlation between total mothers' knowledge, reported practice, attitude, reinforcing and enabling factors according to care of their children with bronchial asthma thorough Precede Proceed phases ($P < 0.001$).

Fig (1): Illustrates that, less than half (46.0%) of studied children had seasonal occurrence of attack in winter.

Fig (2): Shows that, more than two thirds (67.0%) of studied children had more than five times pervious hospitalization.

Fig (3): Demonstrates that most of (82.0% & 66.0%) of studied mothers had total good level of knowledge at post and after three months regarding care of their children with bronchial asthma at Precedes Proceed model implementation phases as compared to pre of Precedes Proceed model implementation phases.

Fig (4): Illustrates that, more than three quarter (78.0% & 66.0%) of the mothers had total scores satisfactory reported practice level regarding care of their children with bronchial asthma at post and after three months of Precedes Proceed model implementation phases as compared to pre Precedes Proceed model implementation phases.

Fig (5): Illustrates that, less than two thirds (68.0% and 74.0%) of studied mothers had positive attitude level at post and after three months of Precede Proceed implementation as compared to pre Precedes Proceed model implementation phases.

Fig(6): Shows that, more than half (56.0% and 76.0%) of the studied mothers had strong reinforcing factors regarding control and management of asthma at post and after three of precede proceed implementation as compared to pre Precedes Proceed model implementation phases.

Fig(7): Shows that, majority (82.0% and 86.0%) of the studied mothers had strong enabling factors regarding control and management of asthma at post and after three of precede proceed implementation as compared to pre Precedes Proceed model implementation phases.

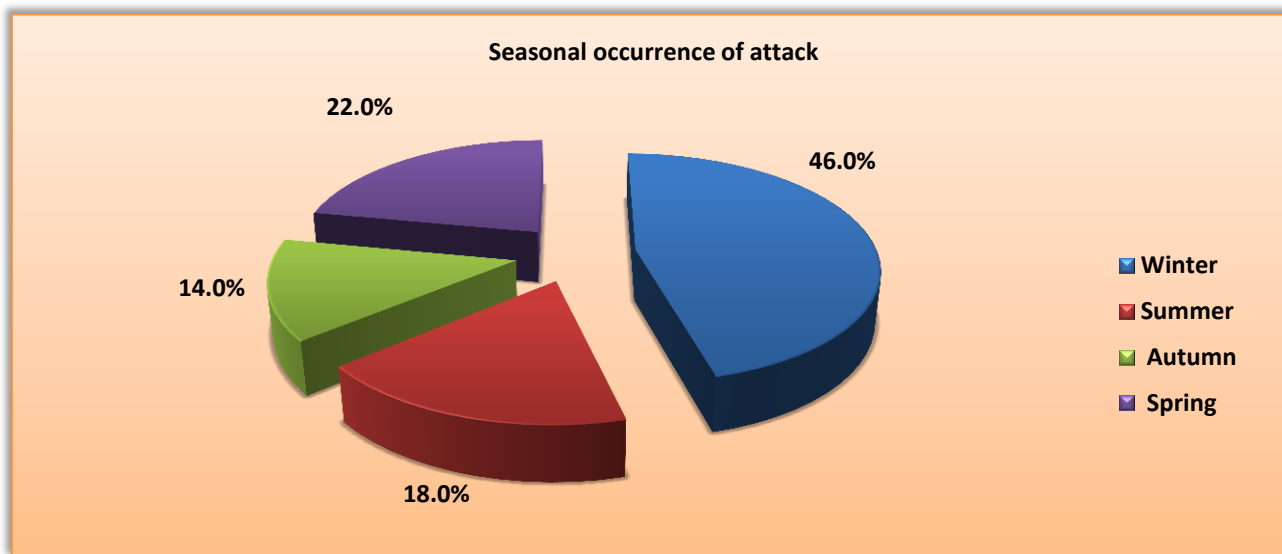
Table (1): Distribution of the studied mothers regarding their characteristics (n=50).

Characteristics of Mothers	Studied Mothers	
	N.	%
Age (years)		
20 - < 25	5	10.0
25 -<30	23	46.0
30-<35	12	24.0
35-≤40	10	20.0
Mean± SD 30.07±4.72 years		
Mothers education		
Illiterate	7	14.0
Read and write	5	10.0
Primary education	9	18.0
Secondary education	21	42.0
High education	8	16.0
Working status		
Working	5	10.0
Not working	45	90.0
Residence		
Rural	13	26.0
Urban	37	74.0
Household overcrowding		
Yes	22	44.0
No	28	56.0
Sources of Mothers' Information		
Doctor	28	56.0
Nurse	9	18.0
Relatives	6	12.0
Books , TV, internet	4	8.0
Other mothers in similar situation	3	6.0

Table (2): Distribution of the studied children regarding their characteristics and disease history (n=50).

Characteristics of Children	Studied children	
	N.	%
Age (in years):		
6 < 8 years	5	10.0
8 < 12 years	30	60.0
12- 14 years	15	30.0
Mean± SD 10.32 ±2.18 years		
Gender		
Female	17	34.0
Male	33	66.0
Child education		
Primary school	11	22.0
Preparatory school	39	78.0
Secondary school	0	0.0
Period of disease		
<3 years	38	76.0
≥3 years	12	24.0
Current medications used		
Anti-histaminic+ Bronchodilator	41	82.0
Anti-biotic+ Anti-histaminic+ Bronchodilator	9	18.0
Family history		
Yes	19	38.0
No	31	62.0

Figure (1): Distribution of the studied children regarding their seasonal occurrence of attack (n=50).



Figure(2): Distribution of the studied children regarding their number of previous hospitalization (n=50).

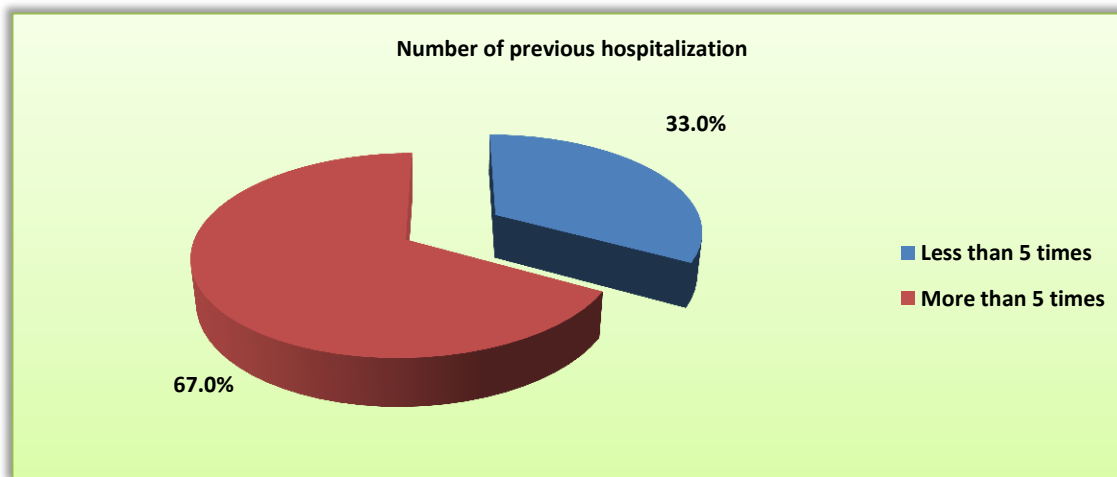


Table (3): Distribution of the studied children regarding their health status at thorough Precede Proceed phases (n=50).

Items	Phases of Precede Proceed implementation(n=50)						X ² (1)	P value	X ² (2)	P value
	Pre- Precede Proceed implementation		Post Precede Proceed implementation		After Precede Proceed implementation					
	N.	%	N.	%	N.	%				
Frequency of asthmatic attack										
Once per week	20	40.0	6	12.0	8	16.0	56.72	<0.05	28.16	<0.05
Once per month	19	40.0	15	30.0	16	32.0				
Once per three months	8	16.0	14	28.0	15	30.0				
Once per six months	3	6.0	15	30.0	11	22.0				
Moist cough increase at night										
Yes	31	62.0	6	12.0	10	20.0	96.24	0.00	48.24	0.00
Sometimes	13	26.0	17	34.0	18	36.0				
No	6	12.0	27	54.0	22	44.0				
Upper respiratory tract infection										
Yes	33	66.0	8	16.0	4	8.0	41.48	0.00	47.12	0.00
Sometimes	12	24.0	12	24.0	15	30.0				
No	5	10.0	30	60.0	31	62.0				
Difficult breathing										
Yes	33	66.0	3	6.0	7	14.0	53.44	0.00	38.40	0.00
Sometime	13	26.0	14	28.0	16	32.0				
No	4	8.0	33	66.0	27	54.0				
Fatigue during any activity										
Yes	34	68.0	7	14.0	12	24.0	52.28	0.00	41.96	0.00
Sometimes	11	22.0	10	20.0	9	18.0				
No	5	10.0	33	66.0	29	58.0				
Fever										
Yes	27	54.0	7	14.0	5	10.0	48.25	0.00	40.12	0.00
Sometimes	16	32.0	15	30.0	11	22.0				
No	7	14.0	28	56.0	34	68.0				

Table (4): Distribution of the studied mothers regarding their knowledge about bronchial asthma thorough Precede Proceed phases (n=50).

Items of Knowledge related to bronchial asthma	Phases of Precede Proceed implementation(n=50)																		X ² (1)	P value	X ² (2)	P value
	Pre- Precede Proceed implementation						Post Precede Proceed implementation						After Precede Proceed implementation									
	Complete correct answer		Incomplete correct answer		Incorrect or unknown answer		Complete correct answer		Incomplete correct answer		Incorrect or unknown answer		Complete correct answer		Incomplete correct answer		Incorrect or unknown answer					
	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%				
Define of asthma	8	16.0	14	28.0	28	56.0	33	66.0	12	24.0	5	10.0	26	52.0	15	30.0	9	18.0	37.48	0.00	20.92	0.00
Mechanisms of bronchial asthma	5	10.0	12	24.0	33	66.0	28	56.0	16	32.0	6	12.0	22	44.0	24	48.0	4	8.0	39.48	0.00	28.56	0.00
Risk Factors	4	8.0	10	20.0	36	72.0	30	60.0	18	36.0	2	4.0	23	46.0	20	40.0	7	14.0	67.68	0.00	52.72	0.00
Causes of asthma	4	8.0	15	30.0	31	62.0	35	70.0	15	30.0	5	10.0	31	62.0	9	18.0	10	20.0	46.23	0.00	43.50	0.00
Symptoms of childhood asthma	6	12.0	14	28.0	30	60.0	33	66.0	13	26.0	4	8.0	26	52.0	14	28.0	10	20.0	43.92	0.00	34.32	0.00
Triggers of childhood asthma	7	14.0	10	20.0	33	66.0	32	64.0	12	24.0	6	12.0	24	48.0	18	36.0	8	16.0	46.22	0.00	29.84	0.00
Average length of attack:	4	8.0	15	30.0	31	62.0	35	70.0	11	22.0	4	8.0	27	54.0	14	28.0	9	18.0	53.72	0.00	32.36	0.00
The day time that attack occurs:	7	14.0	13	26.0	30	60.0	30	60.0	17	34.0	3	6.0	27	54.0	15	30.0	8	16.0	38.88	0.00	27.36	0.00
Complications of asthma	5	10.0	9	18.0	36	72.0	38	76.0	8	16.0	4	8.0	31	62.0	13	26.0	6	12.0	75.44	0.00	60.96	0.00

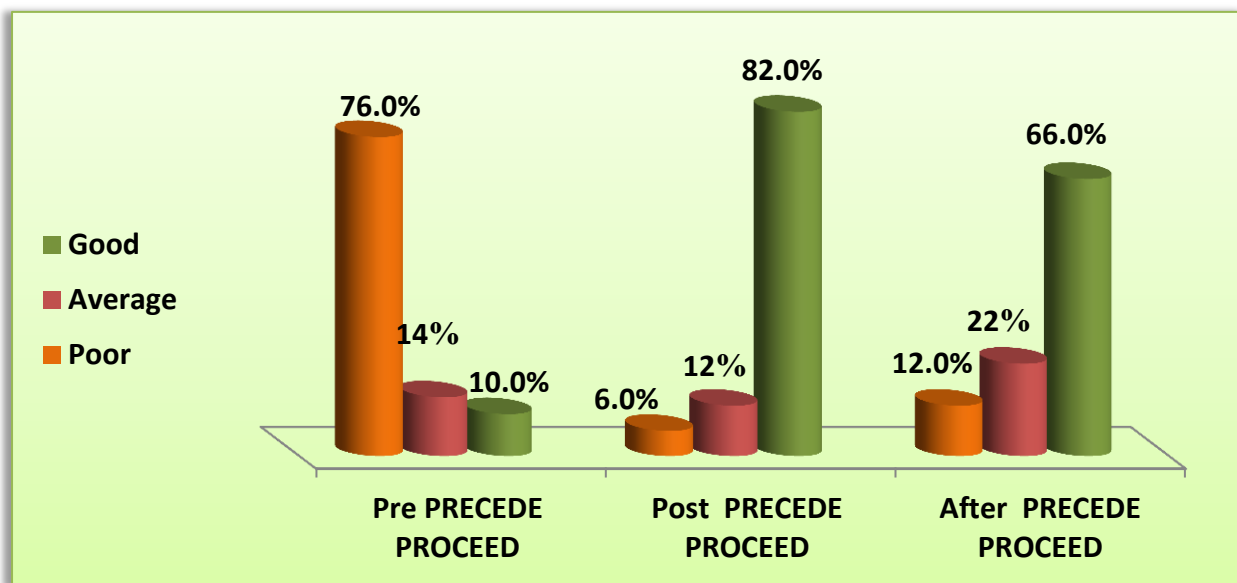
Table (5): Distribution of the studied mothers regarding their knowledge about methods of treatment, prevention bronchial asthma and nutrition thorough Precede Proceed phases (n=50).

Items	Phases of Precede Proceed implementation(n=50)																		P value	P value		
	Pre- Precede Proceed implementation						Post Precede Proceed implementation						After implementation									
	Complete correct answer		Incomplete correct answer		Incorrect or unknown answer		Complete correct answer		Incomplete correct answer		Incorrect or unknown answer		Complete correct answer		Incomplete correct answer		Incorrect or unknown answer					
	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%				
Name and type of child's medication	3	6.0	10	20.0	37	74.0	28	56.0	16	32.0	6	12.0	24	48.0	19	38.0	7	14.0	52.56	0.00	47.16	0.00
Regularity for giving medication	3	6.0	7	14.0	40	80.0	31	62.0	15	30.0	4	8.0	28	56.0	16	32.0	6	12.0	71.48	0.00	36.56	0.00
Treatment of asthma	7	14.0	7	14.0	36	72.0	37	74.0	10	20.0	3	6.0	29	58.0	14	28.0	7	14.0	71.64	0.00	48.16	0.00
Emergency treatment of asthma	6	12.0	12	24.0	32	64.0	35	70.0	10	20.0	5	10.0	39	78.0	9	18.0	2	4.0	53.24	0.00	77.36	0.00
Methods of prevention from asthma	6	12.0	8	16.0	36	72.0	33	66.0	11	22.0	6	12.0	30	60.0	12	24.0	8	16.0	56.76	0.00	49.48	0.00
Management of childhood Asthma	3	6.0	9	18.0	38	76.0	37	74.0	10	20.0	3	6.0	27	54.0	17	34.0	6	12.0	80.68	0.00	55.24	0.00
Food should be avoided	5	10.0	5	10.0	40	80.0	44	88.0	3	6.0	3	6.0	31	62.0	11	22.0	8	16.0	67.24	0.00	65.76	0.00
Healthy food should be intake	6	12.0	6	12.0	38	76.0	34	68.0	14	28.0	2	4.0	31	62.0	9	18.0	10	20.0	71.36	0.00	58.52	0.00

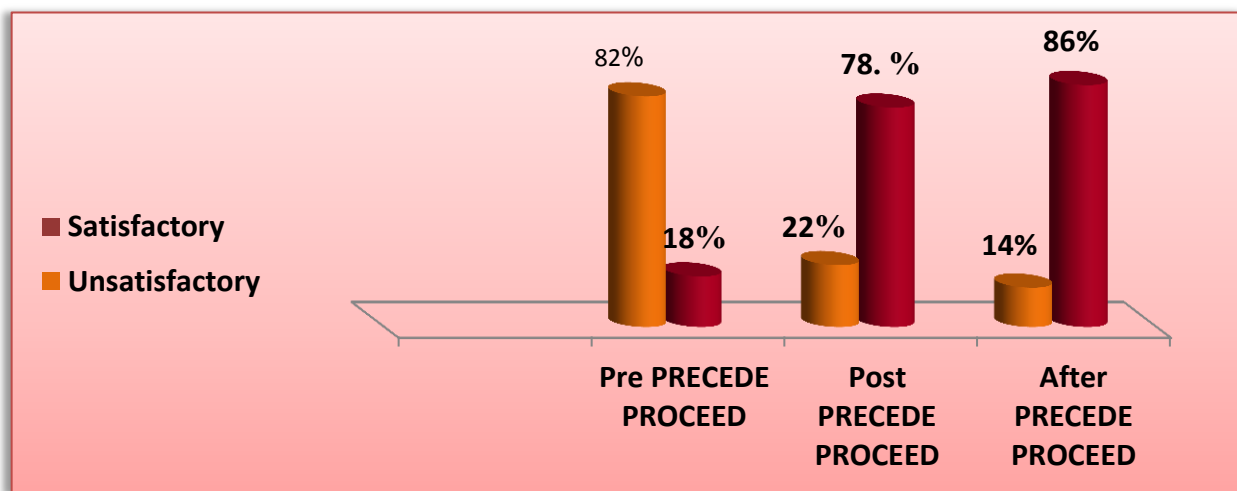
Table (6): Distribution of the studied mothers regarding their reported practice according to care of children with bronchial asthma thorough Precede Proceed phases (n=50).

Items	Phases of Precede Proceed implementation(n=50)												P value	P value		
	Pre- implementation		Precede		Proceed		Post implementation		Precede		Proceed					
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory					
	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%				
Medication administration	9	18.0	41	82.0	46	92.0	4	8.0	38	76.0	12	24.0	55.48	0.00	33.53	0.00
Nutrition	7	14.0	43	86.0	44	88.0	6	12.0	35	70.0	15	30.0	53.88	0.00	33.88	0.00
Breathing exercise	10	20.0	40	80.0	47	94.0	3	6.0	37	74.0	13	26.0	63.92	0.00	36.52	0.00
Mouth care	11	22.0	39	78.0	45	90.0	5	10.0	41	82.0	9	18.0	47.62	0.00	35.68	0.00
Care of child during asthma attacks	9	18.0	41	82.0	43	86.0	7	14.0	36	72.0	14	28.0	48.88	0.00	36.48	0.00
Prevention of asthma attacks	4	8.0	46	92.0	47	94.0	3	6.0	45	90.0	5	10.0	73.28	0.00	67.72	0.00
Methods of nebulizer usage	6	12.0	44	88.0	41	82.0	9	18.0	38	76.0	12	24.0	63.88	0.00	48.52	0.00
Precaution of nebulizer usage	8	16.0	42	84.0	47	94.0	3	6.0	42	84.0	8	16.0	61.72	0.00	46.20	0.00

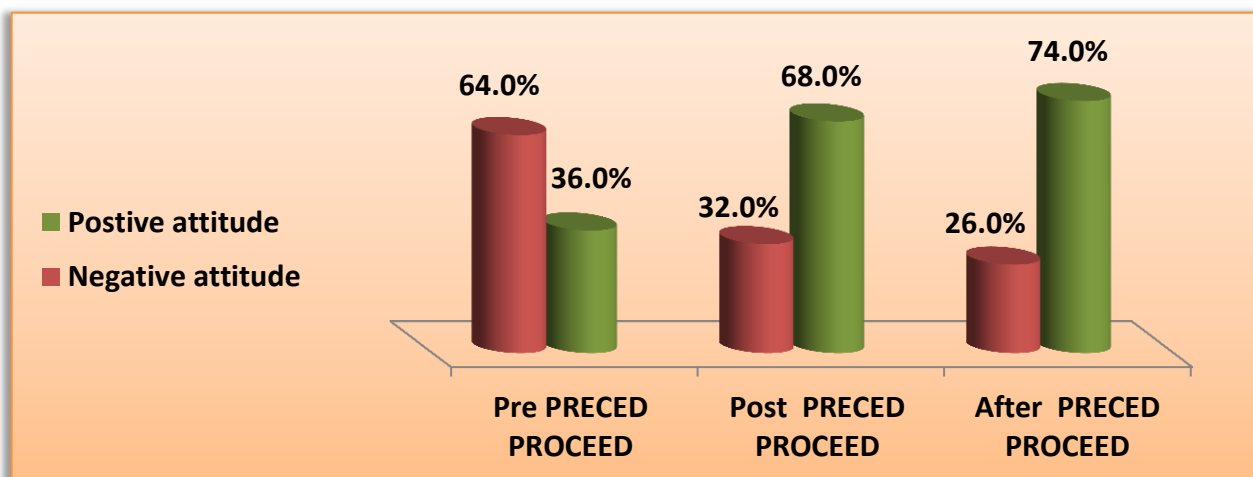
Figure (3): Distribution of the studied mothers total score knowledge regarding care of their children with bronchial asthma through Precede Proceed phases (n=50).



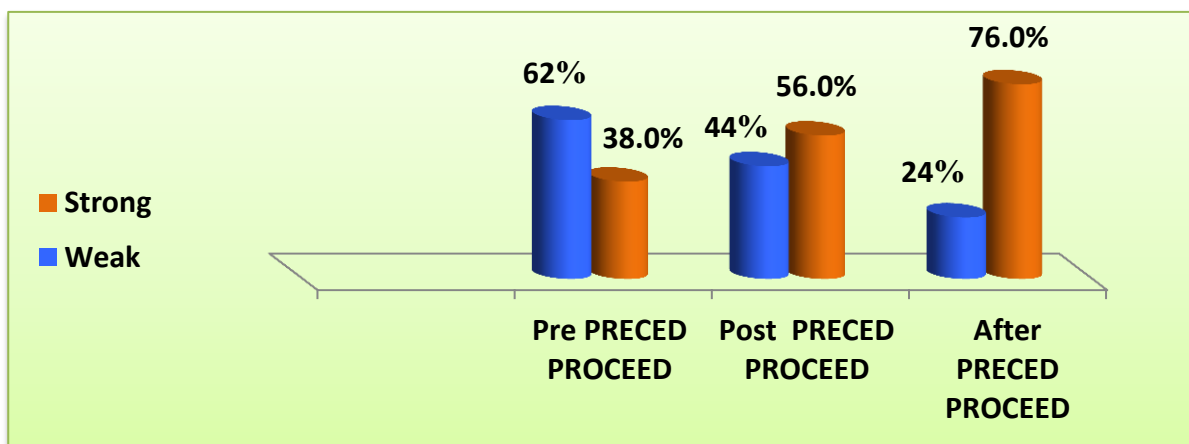
Figure(4): Distribution of the studied mothers total score of reported practice regarding care of their children with bronchial asthma thorough Precede Proceed phases (n=50).



Figure(5): Distribution of studied mothers' attitudes regarding children with asthma thorough Precede Proceed phases (no= 50).



Figure(6): Distribution of the studied mothers according to the presence of reinforcing factors to control and management of asthma trigger thorough Precede Proceed phases (no 50).



Figure(7): Distribution of the studied mothers according to the presence of enabling factors to control and management of asthma trigger thorough Precede Proceed phases (no 50).

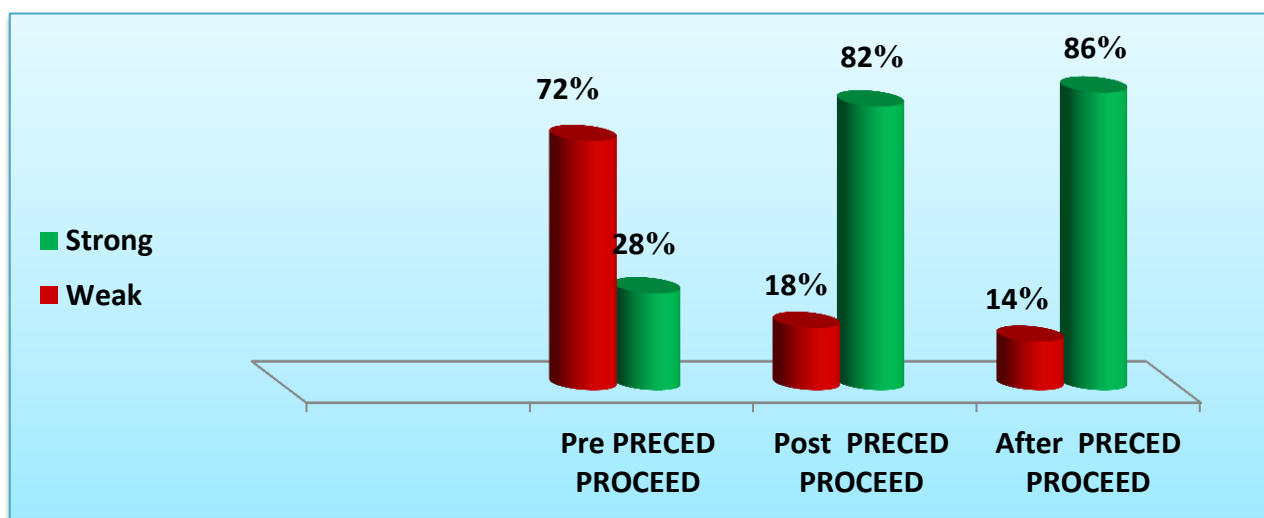


Table (7): Correlation coefficient between total mothers’ knowledge, reported practice, attitude, reinforcing and enabling factors according to care of their children with bronchial asthma thorough Precede Proceed phases (n=50).

Items	Studied mothers’ thorough Precede Proceed phases implementation(n=50)					
	Pre- Precede Proceed implementation		Post Precede Proceed implementation		After Precede Proceed implementation	
	r	P	r	P	r	P
Total mothers’ reported practice.	0.470	0.00	0.601	0.00	0.735	0.00
Total mothers’ attitude	0.414	0.00	0.650	0.00	0.831	0.00
Reinforcing factors	0.596	0.00	0.741	0.00	0.815	0.00
Enabling factors	0.674	0.00	0.733	0.00	0.838	0.00

Discussion

Asthma is an incurable, lifelong condition that places children at increased risk for functional impairments, decreased quality of life, school absences, increased healthcare utilization and irreversible structural airway remodeling. Unfortunately, fewer than 50% of children with asthma are adherent to management regimens, leading to increased disease morbidity and mortality and potentially irreversible airway damage. Moreover, children with uncontrolled asthma have greater visits to the emergency department and to their pediatrician's office due to their asthma symptoms, consequently decreasing their quality of life (**World Health Organization, 2020**).

As regards characteristics of the studied mothers, the present study revealed that, less than half of mothers aged in the age group 25<30, This finding was consistent with those of **Mohamed et al., (2018)**, in a study entitled "Discharge Plan for Mothers to Cope with their Children Suffering from Bronchial Asthma" who found that, less than half of them aged less than 30 years.

As regard, studied mothers education, less than half of mothers had secondary education and most of them didn't work. Also, less than three quarter of studied mothers were living in urban areas. Meanwhile, more than half of them didn't household overcrowding and main sources of them information by doctor. These findings are consistent with those of **Ibrahim, (2017)** who recently conducted a study entitled "Nursing intervention for school age children with bronchial asthma in a rural area" and mentioned that, more than half of the mothers were secondary school and housewives. Also, these findings were corresponding with those of **Abd-Allah et al., (2020)**, a study entitled "Effect of Mobile-Based Education versus Booklet-Based Education on Mothers' Knowledge and Practice towards their Children with Bronchial Asthma" they reported that, 72.0% of mothers asthmatic children were living in urban areas, in good ventilated houses and the main sources of obtaining information among the studied mothers was doctors (53.0%). Meanwhile, these findings accordance with **Hossny et al., (2009)**, who carried out a study entitled "Analysis of the filed data of a sample of Egyptian children with bronchial asthma" observed that allergic diseases were more prevalent cases in urban residents, followed by suburban residents, with few cases coming from rural areas. From the researchers' point of view, exposure of children to air pollution, and allergens, such as pollens, cockroaches, and house dust mites due to asthma especially in autumn and spring.

In relation to personal characteristics of the studied children, the current results revealed that, more than half of children were males, this result agreed with **Ismail & Abu-Elenen, (2019)** entitled about "Assessment of Current Technique of Metered-Dose Inhaler Usage among Mothers of Asthmatic Children in Port Said City" who found that, 59.2% of children were males. From the researchers' point of view, Children males are frequently

reported to have more asthma attacks than girls and that bronchial asthma is more common in boys than girls due to the smaller airway diameters in boys.

The present study showed that more than one third of child had family history of bronchial asthma and more three quarters had duration of disease ≤ 3 years, this result is similar to **Sancakli and Aslan, (2021)**, who studied "The effects of maternal anxiety and attitudes on the adherence to inhaled corticosteroids in children with asthma", they found that 32.0% had positive family history of bronchial asthma.

Regarding the health status of the studied children, the current study demonstrates that, statistically significant improvement were detected in health status of children with bronchial asthma at post and after three months than pre Precedes Proceed model as decrease in frequency of asthmatic attack, moist cough, upper respiratory tract infection, difficult breathing, fatigue during any activity and fever. These results were congruent with **Hassan et al., (2022)**, who studied "Effect of Parents' Empowerment on Quality of Life among School-Aged Children with Bronchial Asthma" they found that, The majority of children had improvement of mean score of total pediatric asthma symptom scale on post and follow-up tests compared to pretest and there were very highly statistical significant between children ($P < 0.001$). Also, these results were congruent with **Ali et al., (2022)**, whose studied "Effect of Family Education on Clinical Outcomes in Children with Asthma" they found that, family education contributed to a significant decrease in asthma symptoms days and nights, family education interventions were significantly effective in reducing asthma symptoms, such as coughing, wheezing, and dyspnea ($P < 0.001$), and improving asthma symptom control in school-age children ($P < 0.001$). From researchers' point of view, improve mothers' knowledge and practices about bronchial asthma management helps them in providing their children by appropriate preventive measures and reduces asthma attack, which reflected on their children health status.

As regards mothers' knowledge about bronchial asthma, the present study results showed that, there was a highly statistically significant difference at pre, post and after three months of Precedes Proceed model implementation regarding all domains of knowledge the studied mothers regarding their about bronchial asthma ($P \leq 0.001$). These results were congruent with those of **Hassan et al., (2022)**, they found that, there was a significant improvement in overall knowledge about asthma on posttests and follow-up test than on pretest. In the same line these results were congruent with those of **Rekha and Padmaja, (2018)**, in India, whose study entitled "A Study to Assess the Effectiveness of Structured Teaching Program on Knowledge regarding Bronchial Asthma among Mothers of under Five Children in Selected Hospitals", showed improvement in knowledge after implementation of the structured teaching program in posttest than pretest. From researchers' point of view, teaching mothers of asthmatic

children is a significant aspect of asthma management because mothers play pivotal role in the children adaptation to the illness, especially children who suffering from uncontrolled asthma.

Concerning, domains of health status of children, the current study highlighted that, there was a highly statistically significant difference at pre, post and after three months of Precedes Proceed model implementation regarding all domains of reported practice of studied mothers regarding care of children with bronchial asthma ($P < 0.001$). These results were consistent with **Mohamed et al., (2018)**, they found that, there were statistically significant differences ($P < 0.001$) in all items of mothers' practices between pre/post implementation of the discharge plan.

As regards, mothers attitude toward children with asthma, the present study showed that, less than three quarter of studied mothers had positive attitude at post and after three months precede proceed implementation compared to pre Precedes Proceed implementation, This study agreement with **Amorha et al., (2020)**, whose study entitled " Knowledge, attitudes, and quality of life of caregivers toward asthma in their children", they showed that, less than one third(28.0%) of the caregivers showed positive attitude toward their children's asthma preprogram. While 75.4% of the showed positive attitude toward their children's asthma at post program. Also, This study accordance with **Koshapor et al., (2018)**, whose study entitled " Assessing Knowledge, Attitude, and Practices of Parents Towards Physical Activity of Children with Asthma Referring to Ahvaz Teaching Hospitals", they illustrated that, more than three quarter 79.0% of mothers had negative attitude towards physical activity in children with asthma. While, 85.0% of mothers had positive attitude at post program implementation.

Also, these results were consistent with **Noureddin et al., (2019)**. whose study entitled" The knowledge attitude and practice (KAP) of mothers of asthmatic children toward asthma in Khartoum asthma clinics", they founded that, the significant associations between the attitude of the mothers and severity of their children's asthma ($P < 0.001$), and between the practice of the mothers and the severity of the disease ($P < 0.001$).

Concerning, mothers enabling factors, the current study illustrated that, majority of the studied mothers had strong enabling factors at post and after three months of precede proceed implementation compared to pre precede proceed implementation. This study accordance with **Fadaei et al., (2021)** whose study entitled" Effect of Health Educational Intervention based on the Educational Phase of the PRECEDE-PROCEED Model on the Promotion of Preventive Behaviors of Brucellosis in the Villagers of Minoodasht", they showed that, there was a significant difference between the average scores of the PRECEDE- PROCEED model educational and ecological assessment phase structures in three phases (before, one month, and three months after intervention) in the case and control groups.

As regards, mothers reinforcing factors, the present study clarified that, more than half and more than three quarter of the studied mothers had strong reinforcing factors at post and after three months of precede proceed implementation compared to pre precede proceed implementation. This study accordance with **Mohamed and Khaton, (2017)**, whose study entitled "The Effect of an Educational Intervention Based on the PRECEDEPROCEED Model on Knowledge, Behaviors and Attitudes of Adolescent Students Regarding Drug Abuse and Addiction", they illustrated that, the educational intervention had significantly positive effect on predisposing, enabling, reinforcing factors and behaviors immediately post and two months after the intervention ($P < 0.001$).

Concerning, total mothers' knowledge, reported practice, attitude, reinforcing and enabling factors, the current study showed that, there was a highly statistically significant positive correlation between total mothers' knowledge, reported practice, attitude, reinforcing and enabling factors according to care of their children with bronchial asthma thorough Precede Proceed phases. This study agreement with **Silvia et al., (2022)**, whose study entitled "Parental knowledge, attitude toward asthma, and its correlation with compliance of asthma management in children", they showed that, majority (87.0%) had moderate knowledge, 92 (82.0%) showed good practices. more than two thirds(66.0%) had negative attitude at post program implementation. Also, this study accordance with **Fadaei et al.,(2021)**,they founded that, before intervention no significant difference was observed among the mean scores of behavioral factors, and knowledge, enabling, and reinforcing factors in the two groups. But, one month and three months after intervention a significant difference was observed between the mean scores of these variables. Meanwhile, This study accordance with **Asker et al.,(2021)**, whose study entitled " Effect of Educational Intervention Based on PRECEDE Model on Preventive Behaviors among High-Risk Individuals for Diabetes Type 2", they showed that, the mean scores of knowledge, attitude, practice, reinforcing factors and enabling factors has increased after educational intervention. The Chi-square test shows a significant difference before and after of education intervention in stages of the model.

Conclusion

Based on the result of the current study, it was concluded that, the educational program based on PRECEDE-PROCEED Model is an effective method in planning and providing health education to improve mothers' knowledge, reported practices and attitudes regarding care of children with asthma and promoting enabling and reinforcing factors that support prevention and control trigger of asthma among children. Also, there was a highly statistically significant positive correlation between total mothers' knowledge, reported practice, attitude, reinforcing and enabling factors according to

care of children with asthma thorough Precede Proceed phases ($P < 0.001$).

Recommendations:

- Educational training programs about asthma should be conducted at primary health care and hospitals for parents to understand and know how to deal with asthma as a chronic disease in order to overcome challenges of asthma control.

- Illustrated booklet and posters should be available at all emergency departments, inpatient departments, outpatient hospital clinics and health centers for all mothers of children with bronchial asthma.

- Periodical follow-ups should be carried out to assess health status of children with bronchial asthma and their mothers' level of knowledge and practices.

- Simple educational pamphlets and posters about asthma should be provided for all mothers in outpatient clinics

- Similar studies should be conducted on a larger sample of children with different age and regions for generalization of the results.

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