

Relationship Between Mothers' Adherence to Therapeutic Regimen of Their Children with Bronchial Asthma and The Recurrence of Attacks

Reem Ali Abdelbaky Elsaid, Nursing Instructor

Technical Institute Nursing, Faculty of Nursing, Alexandria University.

Yousr Abdelsalam Gaafer, Professor

Pediatric Nursing, Faculty of Nursing, Alexandria University.

Doaa abdelmoez Heiba, Assistant Professor

Pediatric Medicine, Faculty of Medicine, Alexandria University.

Rasha Mohamed Abohadida, Lecturer

Pediatric Nursing, Faculty of Nursing, Alexandria University.

Abstract

*Bronchial asthma is a severe public health issue that affects people all over the world; over 300 million people worldwide suffered from bronchial asthma. In Egypt, the prevalence of bronchial asthma among school-age children was 6.2% in Upper Egypt (Assiut) and 46.1% in Cairo. Adherence to therapeutic regimen play an important role in reducing overall healthcare expenditures and has a significant impact on children' life quality, lifespan, and health outcomes. Thus, the mothers have an important role to help their children to decrease the recurrence of bronchial asthma attacks through adhering to care or therapeutic regimen. **Objective:** Explore the relationship between mothers' adherence to the therapeutic regimen of their children with bronchial asthma and recurrence of attacks. **Design:** A correlational descriptive research design was used to accomplish the study. **Setting:** The study was carried out at the Pediatric Outpatient Clinics of Specialized Smouha Hospital. **Subjects:** convenience sampling of 200 mothers and their children, who fulfilled the criteria, comprised the subjects. **Tools:** Three tools were used for data collection. **Tool I:** Socio-Demographic Data and Medical History of Children sheet. **Tool II:** Interview schedule about Mothers' Adherence to Therapeutic Regimen of Their Children with Bronchial Asthma. **Tool III:** Childhood Asthma Control Test and The Occurrence of Recurrent Attacks. **Results:** The present study revealed that nearly two thirds of children were male (64.0%). There was a statistically significant difference between controlled recurrence of bronchial asthma and the adherence to therapeutic regimen ($P=0.048^*$), where more than one half of good adhered mothers to therapeutic regimen their children had controlled recurrence attacks of bronchial asthma (61.1%). On the other hand, it was noticed that 19.6% of mothers were not adhered to therapeutic regimen their children had uncontrolled recurrence attacks of bronchial asthma, while 51.8% of partially adhered mother with therapeutic regimen their children had partially controlled recurrence attacks of bronchial asthma. **Conclusion:** There was a statistically significant difference between Mothers' adherence to the therapeutic regimens of bronchial asthma and the recurrence of attacks in children. **Recommendations:** Implementing a counseling program training and health education sessions for mothers of children with bronchial asthma to improve their awareness about adherence to the therapeutic regimen of bronchial asthma attacks and proper management approaches.*

Keywords: Mothers' Adherence, Therapeutic Regimen, Bronchial asthma, Recurrence of attacks, Children.

Introduction

Bronchial asthma is a chronic inflammatory disorder of the airways that is characterized by paroxysmal or persistent symptoms like dyspnea, tightness in the chest, wheezing, production of sputum, and coughing associated with variable airflow limitation and airway hyper-responsiveness to endogenous or exogenous stimuli (Yang et al., 2021).

According to the (World Health Organization [WHO], 2019) , over 300 million people worldwide suffer with asthma, with the number anticipated to rise to 400 million by 2025 if current trends continue (Serebrisky & Wiznia, 2019). The Middle East region found that bronchial asthma has spread from 5% to 23%. In Egypt, the prevalence of bronchial asthma among school-age children was 6.2% in Upper Egypt (Assiut) and 46.1% in Cairo (Hamed et al., (2020).

Bronchial Asthma can be produced by many triggers. These triggers can be allergenic or nonallergenic. Allergenic triggers which include indoor airborne triggers as smoking, House Dust Mite (HDM), animal hair and dander, and cleaning components (Dharmage et al., 2019). While outdoor allergens include molds, pollen exposure, industrial pollution, and car exhaust (Gautier & Charpin, 2017).

The pharmacological management of bronchial asthma according to the current approach guidelines are corticosteroids, long acting and short acting beta agonists, and leukotriene receptor antagonists are the most popular pharmacological treatments for bronchial asthma in children. Although, the treatment of bronchial asthma was depended on pharmacological approach, there is an important role for non-pharmacological treatment, which include health education, identifying and avoiding asthma triggers, environmental control, and treatment of asthma comorbidities are all general approaches that are suggested for all children (GINA, 2022).

Adherence to therapeutic regimen play an important role in reducing overall

healthcare expenditures and has a significant impact on children' life quality, lifespan, and health outcomes (National Asthma Council Australia, 2018). Adherence is defined as the degree to which a child's actions follow the prescribed course of treatment and the dose of drugs (Gast & Mathes, 2019).

There are many factors affecting mother's adherence to therapeutic regimen, these include social and economic factors, financial difficulties or poverty, problems with transportation, cultural norms, the expense of medications, and insufficient insurance (Unni, 2019).

There is a relationship between childhood bronchial asthma and eating a Mediterranean diet. It supplies food sources rich in antioxidants like vegetables, fruits, legumes, nuts, cereals, and fish. High monounsaturated fat as olive oil, low-fats dairy products, and moderate intake of eggs. Beside sporadic sweets intake, soft drinks, packaged foods, low consumption of meat and poultry, and water as the primary source of hydration. This diet has been proven to be protective of bronchial asthma disease (Calcaterra et al., 2021).

Mothers have a crucial role for the children's adherence to the therapeutic regimen. These include giving children their prescribed treatment, homemade herbal liquids, and getting adequate rest. (Hamed et al., 2020).

Pediatric nurses play an effective role regarding adherence to therapeutic regimen among children with bronchial asthma. A pediatric nurse should provide health education for children with bronchial asthma about their health condition (Ebrahim et al., 2020).

Aim of the study

The study aimed to explore the relationship between mothers' adherence to the therapeutic regimen of their children with bronchial asthma and recurrence of attacks.

Research questions:

- What is the relationship between mothers' adherence to the therapeutic

regimen of their children with bronchial asthma and the recurrence of attacks?

Materials and method:

Materials: research design: A correlational descriptive research design was utilized to accomplish the study.

Setting: the study was carried out at the Pediatric Outpatient Clinics of Specialized Smouha Hospital.

Subjects: A convenience sampling of 200 mothers and their children who fulfilled the following criteria, comprised the study: Age of children ranges from 7 to 11 years, diagnosed with bronchial asthma 6 months before data collection, and free from any other chronic diseases.

Tools: Three tools were used to collect the data. **Tool (1): Socio-Demographic Data and Medical History of Children sheet.** It was developed by the researcher. It included four parts: Part I: Characteristics of Mothers as; age, level of education, residence, occupation, socioeconomic levels, and the number of their children affected with bronchial asthma. Part II: Characteristics of Father as; age, level of education, occupation, and smoking history of father. Part III: Characteristics of Children; age, sex, and birth order. Part IV: Medical History of Children as; type of delivery, maturity at birth, hereditary factor for bronchial asthma, duration from onset of bronchial asthma, current medication, and previous hospitalization. **Tool (II): Interview Schedule about Mothers' Adherence to Therapeutic Regimen of Their Children with Bronchial Asthma.** It was developed by the researcher guided by GINA, (2020) to identify mothers' adherence to the therapeutic regimen of their children with bronchial asthma. It categorized into eight main items as follows: Administration of prescribed medication, nutrition, triggers factors, chest physiotherapy, vaccination, sleeping pattern, sports, and follow-up visit every month.

Scoring system: The total score of application adherence with the therapeutic

regimen was graded as good adherent, partial adherent, and not adherent. Classified as follows: good adherent: 75 % and more, Partial adherent: 60 < 75%, while not adherent: less than 60%.

Tool III: Childhood Asthma Control Test and the Occurrence of Recurrent Attacks:

It was developed by Sousa Félix et al., (2020) to assess asthma control in children 4–11 years old. It comprised of seven questions (4 for child and 3 for caregiver), The child-reported questions, rated on a 4-point Likert scale, contains daytime and activity limitation, nocturnal awakenings, and self-perceptions of asthma; the caregiver-reported questions, rated on a 6-point Likert scale, contains ask about the child's daytime and nocturnal symptoms. The total score was calculated from the responses, and it ranged from 0 to 27. Children had controlled asthma when their scores were 20 to 27, partially controlled asthma with 13 to 19 scores, and uncontrolled asthma when their scores 0 to 12.

Method:

- Approval from the Research Ethics Committee of the Faculty of Nursing was obtained.
- Official letters were sent from Faculty of Nursing, Alexandria University, to directors of the Pediatric Outpatient Clinics of Specialized Smouha Hospital to obtain their approval to collect the data and facilitate the research implementation.
- Tools I and II were developed by the researcher guided by GINA. Tool III was adopted from Sousa Félix et al., (2020) and translated by the researcher.
- Tools I and II were submitted to a jury of five experts in the pediatric nursing field for content validity. The validity was 96.8 % for tool I, 85.7% for tool II and 98% for tool III.

- Reliability of tool II and III was confirmed using Cronbach's Alpha; it was 0.884 for tool II and 0.716 for tool III.
- A pilot study was carried out on 20 mothers to test the clarity and feasibility of the tools. Accordingly, necessary modifications were done. These mothers were excluded from the study subjects.
- Every child and his mother were interviewed individually in the waiting area to collect the necessary data.
- The duration of each interview lasted from 20 to 30 minutes.
- Data was collected over a period of six months extending from December 2021 to May 2022.

Statistical analysis:

- The collected data were coded and entered in special format to be suitable for computer feeding.
- Following data entry, checking and verification process were carried out in order to avoid any errors.
- Data were analyzed using the statistical package for social science SPSS (version 20).
- The following statistical analysis measures were used:
 - **Descriptive statistical measures**, which included: numbers, percentages, and averages (Minimum, Maximum, Arithmetic mean (\bar{X}), Standard deviation (SD).
 - **Statistical analysis tests** included: Chi square and ANOVA test.

Ethical considerations:

- Written informed consent was obtained from the mothers who have school-age children after explaining the aim of the study to them and their children. Children and their mother's participation was on voluntary base, and they had the right to withdraw from the study at any time.

- Privacy of subjects and confidentiality of data were considered.

Result:

Table I describe socio-demographic characteristics of the mothers. It was found that more than one third of mothers aged from 30 years to less than 35 years (38%). Secondary education of mothers was presented by 50.5%. More than two thirds of mothers had medium socioeconomic level (67.0%) and nearly three quarters of them were living in urban area (73.0%).

Table II present socio-demographic characteristics of children. It was observed that more than one third of children aged from 7 years to less than 8 years (37.0%). Nearly two thirds of children were male (64.0%) and more than half of them had a family history of bronchial asthma (54.0%).

Table III portray total level of mothers' adherence to therapeutic regimen of their children with bronchial asthma. It was illustrated that half of mothers were good adherent with triggering factors, follow up, sleeping pattern, and therapeutic nutrition (65.0%, 57.5%, 44.0% & 40.5% respectively). Nearly half of mothers were not adherent to all items of bronchial asthma therapeutic regimen (48.5%), while 42.5% of mothers were partial adherent and small percent of mothers were good adherent to all items of bronchial asthma therapeutic regimen (9.0%).

Table IV show the distribution of the mothers and their children in response to Childhood Asthma Control Test (c-ACT) and the occurrence of recurrent attacks. It was observed that 43.0% of children were partially controlled recurrence asthma and 41.5% of them were controlled recurrence asthma, while small percent of children were uncontrolled recurrence asthma (15.5%).

Table V describes the correlation between levels of recurrence of bronchial asthma and the adherence to therapeutic regimen. It was found that there was a statistically significant difference between recurrence of bronchial asthma and the

adherence to therapeutic regimen ($P=0.048^*$).

Discussion

Bronchial asthma is the most prevalent disease in children, the incidence concerns about 20% of the pediatric population (Fainardi et al., 2021). The prevalence of bronchial asthma is rising globally due to urbanization, increased exposure to pollution, environmental change, and dietary regime. Its management aims to achieve good asthma control. Adequate treatment is necessary for asthma that is well-controlled (Das et al., 2022).

Concerning place of residence, the present study clarified that about three quarters of mothers were lived in urban areas (table I). This finding could be explained by the migration of people from rural areas to the urban areas and exposure to environmental pollutants more in urban than in the rural. The present study was the same line with Al-sammak et al., (2020) who found that three quarters of families were lived in urban areas.

In the present study, it was observed that more than one third of children were diagnosed with bronchial asthma from 1 year to less than 3 years old (table II). This result could be related to the fact that children develop bronchial asthma in the first 3 years of life when lung function testing cannot be used to aid diagnosis (Martin et al., 2022). This result was confirmed with Refat et al., (2021) who stated that one quarter of children less than 3 years diagnosed with bronchial asthma.

Regarding family history of bronchial asthma which is one of the common risk factors to develop children's bronchial asthma (Meatty et al., 2018). The present study described that more than half of children with bronchial asthma had a positive family history (table II). This finding demonstrates the fact that bronchial asthma is a hereditary disease (Cevhertas et al., 2020). These findings are corresponded with Balaji et al., (2015) who discovered that slightly more than half of the children

with bronchial asthma had a positive family history.

Mothers adherence with therapeutic medication is necessary for optimal management of bronchial asthma (Trojanowska et al., 2022). The result of present study indicated that the highest percent of mothers had not adhered to prescribed treatment (Table III). It could be related to mothers' misuse different methods for medication administration or forgotten time of prescribed medication and do not compensate the missed dose on another time, in addition, medium socioeconomic level of mothers plays a vital role in availability of bronchial asthma medication for their children. This result is the same line with AlOlayan et al. (2021) and Trojanowska et al., (2022) who reported that the majority of the mothers had poor adherence to bronchial asthma medication.

Adherence with Mediterranean diet is an important and modifiable risk factor for the improvement of bronchial asthma in children that control children's asthma recurrence attacks (Calcaterra et al., 2021). It was showed from the current study that two fifths of mothers were adhered to therapeutic nutrition (table III). This finding might indicate that there are inverse association between a Mediterranean diet and asthma symptoms, including reduced risk of wheeze, improved lung function, and better asthma control during childhood (Reyes-Angel et al., 2021). The findings of Rice et al., (2015) were congruent with the present study findings, and they stated that children's adherence to the Mediterranean diet was positively affecting the recurrence of asthma attacks. In addition, the current study was agreed with Papamichael et al., (2017) who revealed that there are inverse relationship between bronchial asthma in children and adherence to Mediterranean dietary pattern while nearly one quarter of children had good adherence to the Mediterranean diet. On contrary, Silveira et al (2015) disagreed with the finding of the present study, who found that the adherence

to the Mediterranean diet was linked to an increase in asthma symptoms in children.

Therapeutic adherence refers to a children level of compliance to their prescribed treatment plan (Hamed et al., 2020). Low adherence and inadequate asthma management affecting the recurrence attacks of bronchial asthma in children (Marckmann et al., 2020). The current study findings revealed that mothers were not adhered to therapeutic regimen to their children with bronchial asthma (Table III). It could be due to multiple factors as poor mother's understanding of the bronchial asthma disease and its management. These findings are in harmony mother's knowledge, attitude, practices and behaviors regarding bronchial asthma and its management and reported that the Egyptian mother's adherence was not satisfactory.

Regarding childhood asthma control, the findings of the current study clarified that small percent of children with bronchial asthma were uncontrolled recurrence asthma and more than one third of them were controlled recurrence asthma (table IV). This result could be justified by the reason that mother adherence to therapeutic regimen controlling the recurrence attack of bronchial asthma for their children. The findings of Sousa Félix et al., (2020) were in the same line with the present study findings, who stated that more than one half of children were partially controlled recurrence asthma while more than one third of them were controlled recurrence asthma.

Regarding the relation between mothers' adherence with therapeutic regimen for their children with bronchial asthma and level of recurrence asthma attacks for children. The present study described that the majority of good adhered mothers to therapeutic regimen their children had good controlled recurrence asthma with statistically significant difference (table V). This can be explained that recurrent attacks of children with bronchial asthma can be affected by mothers' adherence with therapeutic

regimen. This finding is in accordance with the finding of Jabeen et al., (2018) who stated that high adherence with treatment regimen was positive significantly associated with well-controlled recurrence asthma in children.

Conclusion:

In conclusion, this study found that, There was a statistically significant difference between Mothers' adherence to the therapeutic regimens of bronchial asthma and the recurrence of attacks in children.

Recommendation:

The following recommendations are suggested to be applied in hospital:

- Implementing a counseling program training and health education sessions for mothers of children with bronchial asthma to improve their awareness about adherence to the therapeutic regimen of bronchial asthma attacks and proper management approaches.
- Layout manual booklet involving recent guidelines about adherence to therapeutic regimen should be available for both mothers and their children with bronchial asthma.
- A hot-line telephone should be accessible for mothers and their children suffering from bronchial asthma.

Table I: Socio-demographic Characteristics of Mothers

Socio-demographic characteristics of mothers	N= 200	
	No.	%
Age (years)		
- 25-	35	17.5
- 30-	76	38.0
- 35-	50	25.0
- 40-	24	12.0
- ≥45	15	7.5
Min. – Max.	25.0- 54.0	Mean ± SD. 34.72 ± 6.100
Education		
- Illiterate/read and write	30	15.0
- Literate certificate	2	1.0
- Primary	15	7.5
- Preparatory	21	10.5
- Secondary	101	50.5
- University	29	14.5
- Postgraduate	2	1.0
Occupation		
- Working	30	15.0
- Not working	170	85.0
Marital status		
- Married	183	91.5
- Divorced	14	7.0
- Widowed	3	1.5
Socioeconomic level		
- Low	29	14.5
- Medium	134	67.0
- High	37	18.5
Place of residence		
- Urban	146	73.0
- Rural	54	27.0
Have other children with bronchial asthma		
- No	129	64.5
- Yes	71	35.5
- One child	49	69.0
- Two children	21	29.6
- Three children	1	1.4
Mothers suffer from bronchial asthma		
- No	158	79.0
- Yes	42	21.0
Duration of mother's bronchial asthma (years)	N= 42	
- <5	4	9.5
- 5-	15	35.7
- 10-	3	7.1
- 15-	3	7.1
- ≥ 20	17	40.5
Min. – Max.	3.0- 22.0	Mean ± SD. 14.21 ± 7.539
Mother's regular follow up of bronchial asthma	N= 42	
- No	25	59.5
- Yes	17	40.5

Table II: Socio-demographic Characteristics of Children

Socio-demographic characteristics of children	N= 200	
	No.	%
Age (years)		
- 7-	74	37.0
- 8-	30	15.0
- 9-	31	15.5
- 10-	24	12.0
- 11-<12	41	20.5
Min. – Max.	7.0- 11.0	Mean ± SD. 8.640 ± 1.566
Gender		
- Male	128	64.0
- Female	72	36.0
Education		
- Did not attend school yet	11	5.5
- Primary	189	94.5
Birth order		
- First	79	39.5
- Second	58	29.0
- Third	42	21.0
- Fourth and more	21	10.5
Maturity at birth (weeks)		
- Preterm (<37)	19	9.5
- Full term (37-<42)	167	83.5
- Post term (≥42)	14	7.0
Type of delivery		
- Normal Vaginal Delivery	66	33.0
- Cesarian section	134	67.0
Children diagnosis of bronchial asthma (years)		
- <1	42	21.0
- 1-	68	34.0
- 3-	25	12.5
- 5-	13	6.5
- ≥7	52	26.0
Min. – Max.	0.8 - 8.0	Mean ± SD. 3.755 ± 2.879
Child' previous hospitalization of bronchial asthma		
- No	147	73.5
- Yes	53	26.5
- Once	32	60.4
- Twice	12	22.6
- Three times	7	13.2
- Four times and more	2	3.8
Frequent time of bronchial asthma		
- Winter	133	66.5
- Summer	5	2.5
- All year	62	31.0
Current treatment		
- Inhaler	200	100.0
Child's weight (kg)		
- 15-	83	41.5
- 25-	68	34.0
- 35-	22	11.0
- 45-	17	8.5
- ≥55	10	5.0
Min. – Max.	12.0- 69.0	Mean ± SD. 29.55 ± 11.31
Family history of bronchial asthma		
- No	92	46.0

- Yes #	108	54.0
- Grand parents	61	56.5
- Uncle/ Aunt	52	48.1
- Cousin/ Nephew	9	8.3

Table III: Total Level of Mothers' Adherence to Therapeutic Regimen of their Children with Bronchial Asthma

Therapeutic regimen	Levels of adherence					
	Not adherent (<60%)		Partial adherent (60<75%)		Good adherent (≥75%)	
	No.	%	No.	%	No.	%
- The prescribed treatment	112	56.0	53	26.5	35	17.5
- Therapeutic nutrition	83	41.5	36	18.0	81	40.5
- Triggering factors	23	11.5	47	23.5	130	65.0
- Chest Physiotherapy	144	72.0	39	19.5	17	8.5
- Vaccination	10	5.0	134	67.0	56	28.0
- Sleeping pattern	60	30.0	52	26.0	88	44.0
- Exercise/ sport activity	158	79.0	26	13.0	16	8.0
- Follow up	21	10.5	64	32.0	115	57.5
- Total Mothers' Adherence	97	48.5	85	42.5	18	9.0

Table IV: Childhood Asthma Control Test (c-ACT) and the Occurrence of Recurrent Attacks.

	Levels of Recurrence					
	Uncontrolled recurrence asthma		Partially controlled recurrence asthma		Controlled recurrence asthma	
	No.	%	No.	%	No.	%
- Levels of recurrence control	31	15.5	86	43.0	83	41.5
- Min- Max	1.0-25.0					
- Mean ± SD.	17.42±5.137					

Table (V): Correlation between Levels of recurrence of bronchial asthma and the Adherence to Therapeutic Regimen.

	Levels of recurrence		Test of
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Mothers' Adherence, Therapeutic Regimen, Children with Bronchial Asthma

	Uncontrolled recurrence asthma (N= 31)		Partially controlled recurrence asthma (N= 86)		Controlled recurrence asthma (N=83)		Total N= 200		Significance
	No.	%	No.	%	No.	%	No	%	
Levels of adherence									
- Not adherent	19	19.6	35	36.1	43	44.3	97	48.5	X ² =9.581 P=0.048*
- Partially adherent	12	14.1	44	51.8	29	34.1	85	42.5	
- Good adherent	0	0.0	7	38.9	11	61.1	18	9.0	
	Mean Score of Recurrence								
Levels of adherence									
- Not adherent	17.00±4.628								F=5.929 P=0.003*
- Partially adherent	17.41±5.629								
- Good adherent	21.44±4.342								

X² Chi Square Test F= ANOVA test * Statistically significant at p ≤ 0.05

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