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PRACTICE OF USING INHALED PREVENTIVE ASTHMA MEDICATION AMONG PARENTS OF PEDIATRIC PATIENTS AT VIETNAM NATIONAL CHILDREN'S HOSPITAL IN 2023 AND RELATED FACTORS

Nguyen Thi Van Anh[1], Hoang Thi Thu Huong[2], Nguyen Thi Ha[2], Do Quang Tuyen[3], Thai Thi Thanh Huyen[3*]

[1]*Vietnam National Children's Hospital - 18/879 La Thanh, Lang Ward, Hanoi City, Vietnam*
[2]*Vinmec Times City International General Hospital - 458 Minh Khai, Times City Urban Area, Vinh Tuy Ward, Hanoi City, Vietnam*
[3]*Thang Long University - Nghiem Xuan Yem, Dinh Cong Ward, Hanoi City, Vietnam*

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ABSTRACT

Objective: This study aimed to describe parental practices in administering preventive inhaled medications and identify factors associated with correct technique among caregivers of asthmatic children at the National Pediatric Hospital in 2023.

Methods: A cross-sectional descriptive study with analytical components was conducted among 209 parents and caregivers of asthmatic children attending the International Center S and the Department of Immunology and Allergy. Data were collected using structured questionnaires and observational checklists. Descriptive and inferential statistics were performed using SPSS 22.0, with a significance level set at $p < 0.05$.

Results: 72.7% demonstrated correct inhaler technique. The lowest accuracy rates were observed in exhalation before inhalation (58.9%) and pressing the canister during inhalation (32.5%). Parental occupation was significantly associated with inhaler technique ($p < 0.05$); farmers were 3.17 times more likely to perform incorrectly compared with civil servants.

Conclusion: Although most parents correctly administered preventive inhalers, coordination errors remain common. Continuous educational interventions and hands-on training are essential to improve parental technique and optimize asthma control in children.

Keywords: Bronchial asthma, inhaled medication, preventive inhaler, parental practice.

1. INTRODUCTION

Bronchial asthma (BA) is a chronic inflammatory disorder of the airways characterized by recurrent episodes of dyspnea, cough, wheezing, and chest tightness. Globally, the prevalence of asthma among children is estimated to be approximately 10.2% [8]. Over the past few decades, both the incidence and the global economic burden of asthma have shown a continuous upward trend. This condition significantly impairs children's quality of life, academic performance, and participation in daily activities [8].

Currently, there is no definitive cure for bronchial asthma. In addition to short-acting reliever medications, children require long-term inhaled prophylactic therapy to control persistent airway inflammation and restore normal respiratory function.

Parents are the primary caregivers for children with asthma and play a crucial role in disease prevention and management, particularly in ensuring the correct use of inhaled medications. Several studies have demonstrated that parental competence in administering prophylactic inhalers directly affects asthma control [5,6].

At the Vietnam National Pediatric Hospital, parental counseling and health education have been identified as essential components in the management of childhood asthma. To establish an evidence-based foundation for developing educational and training interventions aimed at improving parental practices in asthma prevention, this study was conducted with two specific objectives:

1. To describe the practices of using inhaled prophylactic medication for bronchial asthma among

*Corresponding author
Email: huyenttt2@thanglong.edu.vn **Phone**: (+84) 945544559 **DOI:** 10.52163/yhc.v66i8.4045

parents of pediatric patients at the National Pediatric Hospital in 2023.

2. To identify factors associated with parental practices in administering inhaled asthma medications among the study participants.

2. METHODS

2.1. Study Population

The study population consisted of parents or primary caregivers of children diagnosed with bronchial asthma who attended the International Center S and the Department of Immunology and Allergy at the National Pediatric Hospital (NPH) for examination or treatment.

2.2. Study Setting and Duration

- Study period: From January 2023 to April 2023.

- Study location: International Center S and the Department of Immunology and Allergy, Vietnam National Pediatric Hospital.

2.3. Study Design

This was a cross-sectional descriptive study with analytical components.

2.4. Sample Size and Sampling Method

The minimum required sample size (n) was calculated using the formula for estimating a single population proportion, with the following parameters:

$$n = Z^2_{1-\alpha/2} \frac{p(1-p)}{d^2}$$

+ α = 0.05, corresponding to $Z_{1-\alpha/2} = 1.96$.

+ p = 0.25, representing the proportion of parents with inadequate practice in using metered-dose inhalers with spacers, based on the study by Bui Nguyen Ha Nhi [4]

+ q = 1 – p.

+ d = 0.06, the allowable margin of error.

From these parameters, the calculated minimum sample size was 177 participants. A total of 209 participants were actually included in the study.

The sampling method was convenience sampling.

2.5. Variables and Indicators

- General characteristics: Child's gender and age group, place of residence, parental education level, parental occupation, comorbidities in the child, family history of asthma or allergies, presence of smokers in the household, and whether parents received counseling or training on inhaler use.

- Practice variables: Parental practice in using metered-dose inhalers (MDIs) and MDIs with spacers.

2.6. Research Instruments and Assessment Scales

The study utilized a structured tool comprising two parts:

- Part 1: Demographic and clinical characteristics of the child and caregivers (parents).

- Part 2: Two checklists assessing inhaler technique: one for the use of an MDI with a spacer (7 steps) and one for the use of an MDI alone (6 steps).

Each step was scored as follows:

- "Performed correctly" = 1 point;

- "Not performed" or "Incorrectly performed" = 0 points.

If a parent or caregiver made one or more errors or omissions in the checklist steps, the performance was classified as incorrect technique.

2.7. Data Management and Statistical Analysis

Data were cleaned before entry and then entered into EpiData and analyzed using SPSS version 22.0.

Descriptive statistics were applied to summarize participant characteristics and parental inhaler practices.

The Chi-square test was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for factors associated with parental practice.

A p-value of < 0.05 was considered statistically significant.

2.8. Bias and Error Control

To minimize observer bias, investigators were trained and standardized in data collection procedures and the use of the observational checklists before field implementation.

2.9. Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of the National Pediatric Hospital and the Thang Long University Research Ethics Board.

Administrative permissions were obtained from the relevant hospital departments.

All participants were informed about the study's objectives and procedures and participated voluntarily after providing verbal informed consent.

Confidentiality was strictly maintained, and data were used solely for research purposes.

3. RESULTS

3.1. General Characteristics of the Pediatric Patients and Study Participants

Table 1. Demographic and Clinical Characteristics of Children with Bronchial Asthma (N = 209)

Research Variables	Frequency (n)	Percentage (%)
Gender		
Child's gender – Male	115	55.0
Child's gender – Female	94	45.0
Age		
≤ 5 years	40	19.1
> 5 years	169	80.9
Mean age (Mean ± SD), min–max	8.17 ± 2.88	2–17

Research Variables	Frequency (n)	Percentage (%)
Mean age at diagnosis (Mean ± SD), min–max	5.8 ± 2.5	0–11
Residential area		
Urban	146	69.9
Rural	54	25.8
Mountainous	9	4.3
Parental educational level		
High school or below	85	40.7
Intermediate/College	40	19.1
University/Postgraduate	84	40.2
Parental occupation		
Farmers	19	9.1
Civil servants/ Office workers	108	51.7
Others	82	39.2
Family history of asthma/allergy		
Yes	106	50.7
No	103	49.3
Smoker(s) in the family		
Yes	65	31.1
No	144	68.9

The proportion of boys was higher than that of girls. Most children were over 5 years old (80.9%). The mean age was 8.2 ± 2.9 years. Regarding parental education, 40.7% had high school or below, followed by 40.2% with university degrees. More than half of the parents were civil servants or office workers (51.7%), while farmers represented the lowest proportion (9.1%). Over half of the children had family members with asthma or chronic allergic diseases, and 31.1% had family members who smoked.

Table 2. Sources of Guidance on Bronchial Asthma Prevention Practices (N = 209)

Item	Frequency (n)	Percentage (%)
Received instruction on inhaler use – Yes	194	94.6
Received instruction on inhaler use – No	15	5.4
Healthcare providers	193	92.3
Others (Internet, etc.)	21	10.0
Metered-dose inhaler (MDI)	108	48.3
Spacer-assisted inhaler	101	51.7

Most parents (94.6%) had received instruction on the use of preventive inhalers, primarily from healthcare providers (92.3%). The proportion of children using spacer-assisted inhalers was slightly higher than that of children using metered-dose inhalers (51.7% vs. 48.3%).

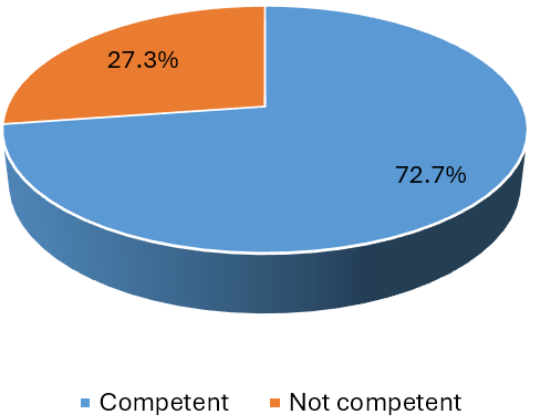

Figure 1. Overall Parental Practice in Asthma Prevention

72.7% of parents demonstrated correct practice in administering preventive inhaler medication to their children.

Table 3. Accuracy of Inhaler Technique in Bronchial Asthma Prevention

Step	Description	Accuracy (%)
Using a spacer		
1	Remove the cap from both the inhaler and the spacer mouthpiece	99
2	Insert the inhaler mouthpiece into the soft opening of the spacer; keep the canister upright.	100
3	Shake the inhaler-spacer unit five times to mix the medication.	100
4	Exhale slowly to the end of a normal breath.	96
5	Insert the spacer mouthpiece, then seal lips (or mask over the nose and mouth).	99
6	Press the canister once to release medication into the spacer.	100
7	Inhale deeply and slowly through the mouth for 10–15 seconds (≈6 breaths).	100
Using a metered-dose inhaler (MDI) without a spacer		
1	Remove the cap by squeezing both sides	99.1
2	Hold the inhaler upright and shake well	98.1
3	Exhale fully until comfortably empty	58.9
4	Place the mouthpiece between your teeth and close your lips around it	96.3

Step	Description	Accuracy (%)
5	Inhale steadily while pressing the canister	32.5
6	Remove the inhaler and hold your breath as long as comfortable	76.6

For spacer use, the lowest correct performance rate was 'Exhale slowly to the end of a normal breath' (96%). For MDI use, 58.9% exhaled completely before inhalation, and only 32.5% performed inhalation and canister pressing simultaneously.

Table 4. Factors Associated with Parental Practice in Using Preventive Inhalers (N = 209)

Associations between caregiver characteristics and inhaler practice are presented below.			
Characteristic	**Incorrect Practice (n=57)**	**Correct Practice (n=152)**	**OR (95% CI)**
Gender – Male	34 (29.6%)	81 (70.4%)	1.30 (0.70–2.40)
Gender – Female	23 (24.5%)	71 (75.5%)	
Age ≤5 years	6 (15%)	34 (85%)	0.41 (0.16–1.03)
Age >5 years	51 (30.2%)	118 (69.8%)	
Urban	43 (29.5%)	103 (70.5%)	1.46 (0.73–2.90)
Rural/ Mountainous	14 (22.2%)	49 (77.8%)	
Education – High school or below	27 (31.8%)	58 (68.2%)	1.60 (0.67–3.83)
Education – Intermediate/ College	9 (22.5%)	31 (77.5%)	
Education – University/Postgraduate	21 (25%)	63 (75%)	1.40 (0.71–2.74)
Occupation – Farmers	10	9 (68.4%)	3.17* (1.17–8.61)
Occupation – Civil servants	28 (29.6%)	80 (70.4%)	
Occupation – Others	19 (23.2%)	63 (76.8%)	3.68* (1.31–10.39)
Comorbidities – None	23 (31.1%)	51 (68.9%)	1.34 (0.72–2.51)
Comorbidities – Present	34 (25.2%)	101 (74.8%)	
Family history – No	34 (33.3%)	68 (66.7%)	1.83 (0.98–3.89)
Family history – Yes	23 (21.5%)	84 (78.5%)	

Associations between caregiver characteristics and inhaler practice are presented below.			
Characteristic	**Incorrect Practice (n=57)**	**Correct Practice (n=152)**	**OR (95% CI)**
Smoking in household – Yes	14 (21.5%)	51 (78.5%)	0.64 (0.32–1.29)
Smoking in household – No	43 (29.9%)	101 (0.1%)	

*: p<0,05.

No statistically significant associations were found between inhaler practice and gender, age, residence, education level, child comorbidities, family history of asthma/allergy, or household smoking. However, parents engaged in farming were 3.17 times more likely to use incorrect inhaler technique than civil servants ($p < 0.05$) and 3.68 times more likely than those in other occupations ($p < 0.05$).

4. DISCUSSION

The study participants had a mean age of 8.2 ± 2.9 years, with the mean age at diagnosis being 5.8 ± 2.5 years. At this age, the administration and supervision of inhaled prophylactic medication were primarily performed by the children's parents. Among the caregivers, 40.7% had completed high school, and more than 50% were government officials or civil servants; the majority resided in urban areas. Therefore, the proportion of parents with a high school education or higher and those employed as civil servants was notably higher than in previous studies by Tran Thi Kieu Anh in Nghe An and Bui Nguyen Ha Nhi in Hue [1],[4]. This difference may be attributed to variations in study settings. The Vietnam National Pediatric Hospital is a leading tertiary pediatric center in Hanoi that receives a diverse patient population from across the country. In contrast, Hue Central Hospital and Vinh General Hospital are provincial general hospitals.

Our study revealed that 72.7% of parents correctly followed the inhaler administration procedure for their children. This proportion was lower than that reported by Tran Thi Kieu Anh, who found that 87.4% of parents used both prophylactic and reliever inhalers properly for bronchial asthma. However, the correct practice rate in our study was higher than that reported by Vo Bao Chau (50%) and Bui Nguyen Ha Nhi (24.8%) [1],[5]. Such differences may result from variations in study sites, populations, and the assessment tools used to evaluate parental practices. At the Vietnam National Pediatric Hospital, in addition to individualized counseling, asthma education is also reinforced through the activities of asthma support clubs.

In the study by Bui Nguyen Ha Nhi, the authors reported that only 12.4% of parents correctly performed the step "holding both the inhaler and spacer, shaking five times, and placing the mask securely over the child's nose and mouth." Only 8.3% completed the step "removing the

mask, wiping the face, and giving the child water or rinsing the mouth" [4]. In our study, the step "exhaling fully until feeling comfortable" had the lowest correct performance rate (58.9%), followed by "inhaling while pressing the canister immediately after starting to breathe in through the mouth, maintaining steady inhalation," with a correct rate of only 32.5%. Any error in these steps can significantly reduce medication efficacy and lead to wastage. Therefore, it is crucial to provide parents with detailed instructions, including demonstrations, observations, and corrections of improper techniques by physicians and nurses. According to Abu et al., parents often hold misconceptions about asthma and demonstrate ineffective management practices. Improving asthma care and treatment adherence, therefore, requires strengthening health education and counseling for caregivers [6].

Our study found no statistically significant association between inhaler use practice and factors such as the child's gender, age group, place of residence, parental education level, comorbidities, family history of asthma or allergy, or household smoking status. This finding differs from that of Salvatore Fasola, who reported a significant correlation between caregivers' knowledge and their preventive asthma practices [7]. Caregivers of children who had experienced asthma attacks, lived in urban areas, and demonstrated better knowledge and attitudes toward medication use showed significantly higher proficiency in using metered-dose inhalers and spacers [4].

In our study, parents engaged in farming were 3.17 times more likely to administer inhalers incorrectly than civil servants and 3.68 times more likely than those in other occupations. This may reflect lower educational attainment and limited access to health education among farmers. Consequently, healthcare providers should prioritize this group in counseling and educational interventions to improve parental competence and enhance asthma management outcomes.

5. CONCLUSION

Most parents in this study demonstrated correct practice in administering prophylactic inhaled medications to their children with bronchial asthma. However, common technical errors—especially those requiring breath coordination—remain a concern. Parental occupation was the only factor significantly associated with improper inhaler use, with farmers exhibiting a higher likelihood of incorrect technique. These findings emphasize the need for ongoing health education, skill-based training, and personalized counseling for parents and caregivers to enhance asthma management outcomes in children.

REFERENCES

[1] Tran Thi Kieu Anh, Nguyen Van Tuan (2023). Knowledge, attitudes, and caregiving practices of mothers regarding childhood asthma at Vinh City General Hospital. Vietnam Journal of Medicine. 2(2023):292–295.

[2] Ministry of Health (2016). Guidelines for the diagnosis and treatment of asthma in children under 5 years old. Decision No. 4888/QD-BYT, September 12, 2016.

[3] Vo Bao Chau, Le Hoang Thang, Lam Huynh Thanh Giang et al. (2024). Relationship between caregiver knowledge, attitudes, and practices and asthma control among children in Can Tho. Can Tho Journal of Medicine and Pharmacy. 81(2024):171–177.

[4] Bui Nguyen Ha Nhi, Bui Binh Bao Son, Le Chuyen (2023). Knowledge, attitude, and practice of primary caregivers in using bronchodilator inhalers among asthmatic children at Hue Central Hospital. Journal of Clinical Medicine, Hue Central Hospital. 88(2023):32–40.

[5] Vo Thi Hong Phuong, Phan Dang Thuc Anh, Nguyen Phuoc Bich Ngoc et al. (2023). Evaluation of knowledge, attitude, and skills in inhaler device use among outpatients with bronchial asthma. Journal of Medicine and Pharmacy. 13(02):2023.

[6] Abu-Shaheen AK, Nofal A, Heena H. (2016). Parental perceptions and practices toward childhood asthma. BioMed Research International. 2016:6364194.

[7] Fasola S, Malizia V, Ferrante G, et al. (2022). Asthma-related knowledge and practices among mothers of asthmatic children: A latent class analysis. International Journal of Environmental Research and Public Health. 19(5):2539.

[8] Zhou W, Tang J. (2025). Prevalence and risk factors for childhood asthma: A systematic review and meta-analysis. BMC Pediatrics. 25:50.