



Evaluation of Knowledge Levels on Asthma Medications among Pediatric Specialists and Residents

Pediatrici Uzmanları ve Asistanlarında Astım İlaçları Konusundaki Bilgi Düzeylerinin Değerlendirilmesi

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ABSTRACT

Aim: Asthma is the most common chronic respiratory disease in childhood, with a rising prevalence both worldwide and in Türkiye. Around 70–80% of pediatric asthma cases are allergic. Despite the presence of established guidelines, knowledge gaps and practice inconsistencies remain. This study aimed to compare the knowledge levels of pediatric specialists and residents regarding asthma treatment.

Material and Method: This cross-sectional study was conducted in February–March 2025 at the University of Health Sciences Ümraniye Training and Research Hospital. Pediatric specialists and residents completed a 31-item questionnaire based on the 2024 GINA guidelines, including 25 questions on asthma management. Each correct answer was scored as 4 points. Statistical analyses were performed using SPSS 22 with Chi-square/Fisher's exact tests for categorical and independent t test/Mann–Whitney U for continuous variables. A p value <0.05 was considered significant. Ethical approval was obtained (26.12.2024; no. 470).

Results: A total of 53 physicians participated (15 specialists, 38 residents). Specialists had longer experience (≥ 7 years: 73.3%), whereas most residents had 1–3 years (84.2%). Asthma training was reported more frequently among specialists (86.7% vs. 44.7%). While overall scores were similar, differences emerged: all specialists recognized spacer efficacy (100% vs. 76.3%, $p=0.039$), whereas residents more often identified omalizumab for allergic asthma (89.5% vs. 53.3%, $p=0.003$) and budesonid/fluticasone as first-line therapy (94.7% vs. 73.3%, $p=0.027$).

Conclusion: These findings provide an exploratory comparison of asthma medication knowledge between pediatric specialists and residents. Specialists showed stronger knowledge of inhaler devices, whereas residents were more updated on biologics and pharmacotherapy. Given the cross-sectional design and limited sample size, the results should be interpreted cautiously and should not be generalized. Tailored educational strategies may enhance standardized, evidence-based pediatric asthma care.

Keywords: Asthma, pediatrics, knowledge level, inhaler therapy, biologics

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ÖZ

Amaç: Astım, çocukluk çağında en sık görülen kronik solunum yolu hastalığıdır ve hem dünyada hem de Türkiye'de prevalansı giderek artmaktadır. Pediyatrik astım vakalarının yaklaşık %70–80'i alerjik kökenlidir. Mevcut kılavuzlara rağmen bilgi eksiklikleri ve uygulama farklılıkları devam etmektedir. Bu çalışmada, pediatri uzmanları ile asistanlarının astım tedavisine ilişkin bilgi düzeylerinin karşılaştırılması amaçlandı.

Gereç ve Yöntem: Bu kesitsel çalışma Şubat–Mart 2025 tarihleri arasında Sağlık Bilimleri Üniversitesi Ümraniye Eğitim ve Araştırma Hastanesi'nde gerçekleştirildi. Pediatri uzmanları ve asistanları, 2024 GINA kılavuzuna dayalı 31 soruluk bir anketi (25 astım yönetimi sorusu dahil) yanıtladı. Her doğru cevap 4 puan üzerinden değerlendirildi. İstatistiksel analizler SPSS 22 programında yapıldı; kategorik değişkenler için Ki-kare/Fisher exact test, sürekli değişkenler için bağımsız t testi/Mann–Whitney U testi kullanıldı. $p<0.05$ anlamlı kabul edildi. Etik onay alındı (26.12.2024; no. 470).

Bulgular: Toplam 53 hekim çalışmaya katıldı (15 uzman, 38 asistan). Uzmanların daha uzun deneyime sahip olduğu görüldü (≥ 7 yıl: %73,3), asistanların ise çoğunluğu 1–3 yıl deneyime sahipti (%84,2). Astım eğitimi alma oranı uzmanlarda daha yüksekti (%86,7'ye karşı %44,7). Genel skorlar benzer olmakla birlikte belirlenen farklılıklar vardı: Tüm uzmanlar spacer etkinliğini doğru olarak bildi (%100 vs. %76,3; $p=0,039$). Asistanlar ise alerjik astımda omalizumabı (%89,5 vs. %53,3; $p=0,003$) ve budesonid/flutikazonu ilk basamak tedavi olarak (%94,7 vs. %73,3; $p=0,027$) daha sık belirlediler.

Sonuç: Bu bulgular, pediatri uzmanları ve asistanları arasında astım ilaç bilgisine ilişkin kişisel bir karşılaştırma sunmaktadır. Uzmanlar inhaler cihaz kullanımı konusunda daha güçlü bilgiye sahipken, asistanlar biyolojik ajanlar ve farmakoterapi konusunda daha güncel bilgiye sahipti. Çalışmanın kesitsel tasarımı ve sınırlı örneklem büyüklüğü nedeniyle sonuçlar dikkatle yorumlanmalı ve genellenmemelidir. Hedefe yönelik eğitim stratejileri, pediatrik astım bakımında standart ve kanıta dayalı uygulamaların geliştirilmesine katkı sağlayabilir.

Anahtar Kelimeler: Astım, pediatri, bilgi düzeyi, inhaler tedavi, biyolojik ajanlar

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INTRODUCTION

Asthma is the most common chronic respiratory disease of childhood, characterized by airway inflammation and influenced by both genetic predisposition and environmental factors (1). Globally, its prevalence ranges between 3% and 38%, and together with allergic rhinitis, asthma represents the most frequently encountered allergic disorder in children (2,3). Approximately 70–80% of pediatric asthma cases are of the allergic phenotype (4,5). The disease typically presents with symptoms such as shortness of breath, wheezing, chest tightness, and cough, accompanied by reversible airway obstruction and increased bronchial hyperresponsiveness. The diagnosis of asthma is primarily clinical and should be supported by detailed personal and family history, as well as complementary laboratory findings, while carefully excluding alternative diagnoses (6). Environmental factors such as air pollution and tobacco smoke exposure, nutritional deficiencies, and genetic susceptibility are considered major contributors to the development of asthma (7).

Asthma exacerbations are associated with increased morbidity and significantly higher healthcare costs (8). Although the regular use of inhaled corticosteroids (ICS) and/or ICS combined with long-acting β_2 -agonists (LABA) can reduce the risk of exacerbations, they cannot completely prevent them (9). Children presenting to emergency departments or requiring hospitalization for asthma remain at an increased risk of future exacerbations, regardless of disease severity or control status (10). In cases where ICS and LABA therapy is insufficient, preventive strategies involving biologic agents such as anti-IgE and anti-IL-5 therapies have been introduced. Nevertheless, preventing exacerbations remains a largely unmet clinical need (11).

In recent years, biologic agents have emerged as a significant advancement in asthma management, particularly in patients with severe, treatment-resistant disease. Among pediatric populations, omalizumab (anti-IgE) and mepolizumab (anti-IL-5) have been approved for use in children aged ≥ 6 years with severe allergic asthma. Other biologics, including benralizumab (anti-IL-5R) and dupilumab (anti-IL-4R), are typically approved for adolescents aged ≥ 12 years and adults (12).

Given these developments, evaluating the knowledge levels of pediatric specialists and residents regarding asthma treatment is crucial for optimizing management, identifying knowledge gaps, and shaping targeted educational interventions. This study aims to assess the awareness and knowledge of pediatric specialists and residents about asthma pharmacotherapy and to highlight potential differences between the two groups. The findings are expected to contribute to strategies that enhance evidence-based and standardized approaches in pediatric asthma care.

MATERIAL AND METHOD

Ethical Approval

The study protocol was approved by the Clinical Research Ethics Committee of Ümraniye Training and Research Hospital (Decision No: 470, Date: December 26, 2024). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This cross-sectional study was conducted between February 1 and March 1, 2025, at the Department of Pediatrics, University of Health Sciences Ümraniye Training and Research Hospital, Istanbul, Türkiye. The study population consisted of pediatric specialists and pediatric residents.

Inclusion criteria were being a certified pediatric specialist or an actively practicing pediatric resident.

Exclusion criteria included the presence of chronic respiratory conditions other than asthma (e.g., chronic obstructive pulmonary disease, cystic fibrosis, bronchiectasis), asthma complicated by other systemic diseases (e.g., primary immunodeficiency, pulmonary vasculitis, sickle cell anemia, neuromuscular disorders), concurrent asthma treatment in another clinic, incomplete or invalid survey responses, intentional treatment discontinuation or irregular drug use, and failure to comply with standard study procedures.

Data Collection

Data were collected using a structured 31-item questionnaire developed on the basis of the Global Initiative for Asthma (GINA) 2024 guidelines. The questionnaire comprised two main sections:

Demographic and professional characteristics (6 items): age, gender, academic title, years of professional experience, prior asthma treatment training, and self-assessed knowledge level.

Asthma treatment knowledge (25 items): clinical approaches and pharmacological knowledge related to asthma management.

The survey was administered through face-to-face interviews. Questions were presented in random order, with no time restrictions. Missing responses were completed after review, and participants who provided multiple answers were asked to select the most accurate option.

Scoring

Each correct response was awarded 4 points, while incorrect answers received 0 points. Only theoretical knowledge was evaluated; practical skills and hands-on clinical performance were not included. The final score reflected the theoretical knowledge level of each participant.



Statistical Analysis

All data were analyzed using IBM SPSS Statistics version 22 (IBM Corp., Armonk, NY, USA). Descriptive statistics included mean, standard deviation, median, minimum–maximum values, and percentages. For categorical variables, the Chi-square test was applied, and the Fisher’s Exact test was used when expected frequencies were below 5. The distribution of continuous variables was assessed with the Kolmogorov–Smirnov and Shapiro–Wilk tests. Normally distributed variables were analyzed using the independent-samples t-test, while non-normally distributed variables were evaluated with the Mann–Whitney U test. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 53 physicians, including 15 pediatric specialists and 38 pediatric residents, were enrolled in the study. Among the specialists, 60% were female and 40% were male, whereas the resident group consisted of 65.8% females and 34.2% males. In terms of age distribution, the majority of specialists (73.4%) were between 31–40 years, while 86.8% of residents were in the 25–30 age group. Regarding professional experience, 73.3% of specialists had ≥7 years of practice, whereas 84.2% of residents had 1–3 years of work experience. The rate of having received training on asthma treatment was 86.7% among specialists and 44.7% among residents. When self-assessment of knowledge levels was evaluated, 60% of specialists rated themselves as “adequate/very adequate,” compared with only 15.8% of residents. The majority of residents (65.8%) described their knowledge as “moderate.”

When comparing pediatric specialists and residents regarding knowledge of asthma treatment, no overall significant differences were observed between the groups (p>0.05). However, some questions revealed statistically significant differences. While all specialists correctly identified that spacer devices improve inhaler drug efficacy, the rate was significantly lower among residents (p=0.039). Conversely, residents achieved significantly higher correct response rates for the recommendation of omalizumab in allergic asthma (p=0.003) and the use of budesonide and fluticasone as controller therapies (p=0.027). Additionally, clinically notable differences were observed regarding the use of corticosteroids during exacerbations (p=0.095) and the non-recommendation of long-acting β2-agonists as monotherapy (p≈0.237). These findings indicate that while both groups demonstrated comparable knowledge of core asthma treatment principles, specialists were stronger in areas requiring practical device-related experience, whereas residents were more knowledgeable about recent pharmacological therapies.

Table 1. Demographic and Professional Characteristics of Participants

TITLE	Pediatric Specialist		Pediatric Resident	
	n	%	n	%
Gender				
Female	9	60.0%	25	65.8%
Male	6	40.0%	13	34.2%
Age				
25-30	1	6.7%	33	86.8%
31-35	7	46.7%	4	10.5%
36-40	4	26.7%	0	-
>40	3	20.0%	0	-
22	0	-	1	2.6%
Years of practice				
1-3	0	-	32	84.2%
4-6	4	26.7%	6	15.8%
7-10	8	53.3%	0	-
>10	3	20.0%	0	-
Have you received asthma treatment training?				
Yes	13	86.7%	17	44.7%
No	2	13.3%	21	55.3%
Self-assessed knowledge level on asthma treatment				
Very sufficient	3	20.0%	0	-
Sufficient	6	40.0%	6	15.8%
Moderate	5	33.3%	25	65.8%
Insufficient	1	6.7%	7	18.4%

Table 2. Comparison of Asthma Treatment Knowledge Levels Between Physician Groups

TITLE	Pediatric Specialist		Pediatric Resident		p
	n	%	n	%	
Steroid use during exacerbation					0.095
Correct	7	46.7%	27	71.1%	
Incorrect	8	53.3%	11	28.9%	
Inhaled steroids as main treatment in asthma					0.979
Correct	11	73.3%	28	73.7%	
Incorrect	4	26.7%	10	26.3%	
Beta-2 agonists as first choice in asthma control					0.632
Correct	7	46.7%	15	39.5%	
Incorrect	8	53.3%	23	60.5%	
Montelukast as first-line therapy in asthma control					0.868
Correct	11	73.3%	27	71.1%	
Incorrect	4	26.7%	11	28.9%	
Correct technique reduces systemic side effects of inhaled drugs					0.986
Correct	13	86.7%	33	86.8%	
Incorrect	2	13.3%	5	13.2%	
Long-acting beta-2 agonists not recommended alone					0.237
Correct	12	80.0%	24	63.2%	
Incorrect	3	20.0%	14	36.8%	
Salbutamol is a short-acting beta-2 agonist					0.895
Correct	12	80.0%	31	81.6%	
Incorrect	3	20.0%	7	18.4%	
Oral steroid use causes permanent growth retardation					0.473
Correct	10	66.7%	29	76.3%	
Incorrect	5	33.3%	9	23.7%	



Table 2. Comparison of Asthma Treatment Knowledge Levels Between Physician Groups

TITLE	Pediatric Specialist		Pediatric Resident		p
	n	%	n	%	
Mouth rinsing recommended after ICS use					0.502
Correct	14	93.3%	33	86.8%	
Incorrect	1	6.7%	5	13.2%	
Spacer devices increase inhaler drug effectiveness					0.039
Correct	15	100.0%	29	76.3%	
Incorrect	0	-	9	23.7%	
PEF meter assesses asthma control level					0.296
Correct	11	73.3%	22	57.9%	
Incorrect	4	26.7%	16	42.1%	
Drug effectiveness is not influenced by age or inhalation device type					0.560
Correct	9	60.0%	26	68.4%	
Incorrect	6	40.0%	12	31.6%	
Omalizumab is recommended for allergy-related asthma					0.003
Correct	8	53.3%	34	89.5%	
Incorrect	7	46.7%	4	10.5%	
Long-acting beta-2 agonists for exercise-induced asthma					0.381
Correct	4	26.7%	15	39.5%	
Incorrect	11	73.3%	23	60.5%	
All inhaler devices work the same way					0.868
Correct	11	73.3%	27	71.1%	
Incorrect	4	26.7%	11	28.9%	
Influenza vaccination recommended in chronic asthma					0.518
Correct	13	86.7%	30	78.9%	
Incorrect	2	13.3%	8	21.1%	
Budesonide and fluticasone used in asthma treatment					0.027
Correct	11	73.3%	36	94.7%	
Incorrect	4	26.7%	2	5.3%	
LTRAs are used only in allergic rhinitis					0.437
Correct	9	60.0%	27	71.1%	
Incorrect	6	40.0%	11	28.9%	
Biological agents can be used starting from age 5					0.481
Correct	4	26.7%	14	36.8%	
Incorrect	11	73.3%	24	63.2%	
Combination inhalers consist of steroid and long-acting bronchodilator					0.771
Correct	13	86.7%	34	89.5%	
Incorrect	2	13.3%	4	10.5%	
IV beta-2 agonist is first-line in exacerbation					0.932
Correct	12	80.0%	30	78.9%	
Incorrect	3	20.0%	8	21.1%	
Inhalation device skills affect treatment effectiveness					0.986
Correct	13	86.7%	33	86.8%	
Incorrect	2	13.3%	5	13.2%	
Spirometry is used to evaluate treatment response					0.362
Correct	11	73.3%	32	84.2%	
Incorrect	4	26.7%	6	15.8%	
Early corticosteroid reduces symptom severity					0.505
Correct	11	73.3%	31	81.6%	
Incorrect	4	26.7%	7	18.4%	
Inhaler dose should be adjusted by symptom severity and age					0.842
Correct	14	93.3%	36	94.7%	
Incorrect	1	6.7%	2	5.3%	

DISCUSSION

Asthma is a chronic respiratory disease with a steadily increasing prevalence both in Türkiye and worldwide. Recent data suggest that, despite extensive preventive and therapeutic strategies, asthma prevalence has increased by nearly 50% over the past decade. This underscores the necessity of early and accurate diagnosis and effective management. Despite the availability of numerous national and international guidelines, gaps remain in asthma diagnosis and management (13,14). Early administration of corticosteroids in acute asthma has been shown to reduce hospital admissions and improve symptom control (15). Effective management requires not only monitoring exacerbation frequency but also considering age-specific variations in clinical presentation (16). In one study, 94.1% of pediatricians emphasized the indispensability of inhaled corticosteroids (ICS) in asthma treatment (17). However, practical discrepancies persist, influenced by socioeconomic, cultural, and educational variations, as well as by differences in post-graduate training and clinical experience.

In this context, physician-related factors, particularly level of training, clinical experience, and exposure to updated guidelines, play a critical role in determining the quality and consistency of asthma management. Differences in knowledge and practice patterns among pediatric physicians may directly influence treatment decisions, adherence to guideline-based care, and ultimately patient outcomes. Therefore, evaluating and comparing knowledge levels among pediatric specialists and residents is essential for identifying gaps that may compromise standardized asthma care.

In our study, the high proportion of female physicians in both groups reflects the growing feminization of pediatrics in Türkiye. Compared with earlier findings where male pediatricians were more common (17), this shift highlights evolving demographic dynamics in the field. Although gender itself is not expected to directly influence asthma management knowledge, changing workforce demographics may indirectly affect training patterns, learning preferences, and continuing medical education needs, which should be taken into account when designing educational interventions.

Asthma training was reported by 86.7% of specialists but only 44.7% of residents, and this was mirrored in self-perceived knowledge levels. While 60% of specialists considered themselves "adequate/very adequate," the majority of residents (65.8%) rated their knowledge as only "moderate." This underscores the impact of clinical experience and structured training on knowledge acquisition.



These findings suggest that formal and repeated educational exposure, rather than self-directed learning alone, is crucial for building confidence and competence in asthma management, particularly during residency training. The finding that all specialists correctly acknowledged the benefits of spacer devices, compared to only 76.3% of residents, highlights the influence of hands-on clinical exposure. Literature strongly supports spacer use as it enhances pulmonary drug delivery, reduces oropharyngeal deposition, and improves therapeutic outcomes in children (18). Randomized controlled trials have even demonstrated that metered-dose inhalers with spacers are at least as effective, if not superior, to nebulizers in acute asthma management (19). This suggests that residents require more structured practical training in inhaler device use.

The lower recognition rate among residents may reflect limited practical exposure to device-based education or insufficient emphasis on inhaler technique during early training years, despite its well-established clinical importance. Conversely, residents outperformed specialists regarding awareness of omalizumab for allergic asthma (89.5% vs. 53.3%; $p=0.003$). Omalizumab is approved for children ≥ 6 years with severe IgE-mediated asthma and has been shown to reduce exacerbation frequency (20). This suggests that younger physicians, having trained more recently, are better exposed to biologic therapies, whereas senior physicians may have completed their training before such treatments were widely introduced.

This finding highlights the dynamic nature of asthma pharmacotherapy and underscores the need for continuous professional development to ensure that experienced clinicians remain familiar with rapidly evolving treatment options. Similarly, residents demonstrated higher knowledge regarding the use of budesonide and fluticasone as controller therapies (94.7% vs. 73.3%; $p=0.027$). This aligns with literature emphasizing ICS as the cornerstone of pediatric asthma management, reducing symptoms, exacerbations, and improving quality of life (17). The comparatively lower rate among specialists may reflect entrenched clinical habits or less frequent updating of pharmacological knowledge. This discrepancy illustrates how reliance on long-standing clinical routines, without regular guideline updates, may contribute to variability in treatment approaches.

Knowledge differences were also noted in acute asthma management. Although not statistically significant, residents more frequently recognized the role of systemic corticosteroids during exacerbations (71.1% vs. 46.7%; $p=0.095$). Guidelines recommend early systemic corticosteroid use in moderate-to-severe exacerbations, as this reduces relapse and hospitalization rates. The lower recognition rate among specialists may reflect variability in real-world practices or limited exposure

to updated guideline recommendations. While this difference did not reach statistical significance, it remains clinically relevant and suggests areas where targeted educational reinforcement may be beneficial.

CONCLUSION

Overall, while both groups demonstrated moderate overall knowledge, their strengths were complementary: specialists were more proficient in practical device-related skills, whereas residents excelled in updated pharmacological knowledge. Rather than viewing these differences as deficiencies, they may be interpreted as reflecting distinct stages of professional development. Integrating the practical expertise of specialists with the guideline-oriented knowledge of residents through collaborative and interdisciplinary educational models may help bridge existing gaps.

Taken together, the findings of this study emphasize the importance of structured, continuous, and level-specific education in pediatric asthma management. Educational strategies that combine hands-on device training for residents with regular guideline updates for specialists may promote more uniform, evidence-based care. Although the findings are exploratory in nature, they provide valuable insights that may inform future educational programs and multicenter studies aimed at optimizing pediatric asthma management.

Study Limitations

This study has several limitations. The relatively small sample size and single-center design may limit the generalizability of the findings. In addition, the cross-sectional nature of the study does not allow causal inferences. Furthermore, the evaluation was limited to theoretical knowledge and did not include assessment of practical skills or direct observation of clinical practice.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study protocol was approved by the Clinical Research Ethics Committee of Ümraniye Training and Research Hospital (Decision No: 470, Date: December 26, 2024).

Informed Consent: All participants provided written informed consent.

Referee Evaluation Process: Externally peer-reviewed.

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