

Current Recommendations on the Management of Pediatric Asthma and Allergic Rhinitis during the COVID-19 Pandemic versus Real-Life Practice

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Keywords

Asthma · Allergic rhinitis · Children · Management · COVID-19 · Pandemic · Knowledge

Abstract

Introduction: Several statements and position papers on the management of childhood asthma and allergies during the COVID-19 pandemic have been published of late. The aim of this study was to evaluate the knowledge and awareness of pediatricians and family physicians regarding the management of asthma and allergic rhinitis during the pandemic according to recently published updated guidelines.

Method: We conducted an online survey among pediatricians and family physicians in Turkey, using a questionnaire designed to evaluate 4 items: (1) the relationship between COVID-19 infection risk and pediatric asthma/allergic rhinitis and medications used in treatment; (2) the follow-up and management of asthma/allergic rhinitis according to published updated recommendations; (3) pediatricians' and family physicians' observations and perceptions of treatment compliance and the attitudes of their pediatric asthma patients; and (4) pediatricians and family physicians' attitudes to using telehealth in the follow-up and management of pediatric asthma patients during the pandemic. **Results:** A total of 346 participants responded to the survey. The relationship between the risk of COVID-19 and asthma was known by less than 25% of the participants. More than 33%

of family physicians and 20% of pediatricians were unaware that asthma medication does not lead to a susceptibility to COVID-19 infection; 55% of family physicians and 48% of pediatricians thought that patients showed better compliance with asthma controller medication; over 33% of pediatricians and approximately 50% of family physicians stated that they could not distinguish between an asthma attack and lung involvement in COVID-19 infection; of the respondents, over 75% stated that they prefer face-to-face visits with patients, even in situations that do not require a physical examination. **Conclusion:** The overall knowledge and awareness of pediatricians and, especially, family physicians regarding the management of pediatric asthma/allergic rhinitis during the pandemic is not at a satisfactory level. There is an urgent need to inform them about updated recommendations appearing in recent guidelines published by allergy organizations.

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Introduction

The first cases of the coronavirus disease 2019 (COVID-19), caused by the novel, severe, acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2), were reported in China in December 2019 and rapidly led to a

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worldwide pandemic. Children have so far accounted for just 1–5% of diagnosed COVID-19 cases and tend to show milder symptoms than adults; deaths among children have been extremely rare [1]. However, it became evident that severe COVID-19 infections were particularly prevalent in certain risk groups, such as in those with underlying chronic diseases. Asthma and allergic rhinitis are among the most common chronic diseases in childhood. It is well known that there is a relationship between respiratory viral infections and asthma control. Therefore, it can be concluded that the best protection from severe COVID-19 infection is afforded by optimal asthma control.

Clinicians that play active roles in the care of asthmatic and allergic rhinitis patients generally need guidance, which becomes more important in specific situations, like the COVID-19 pandemic, as clinicians may have period-specific concerns about treatment and follow-up. Expert scientists have published statements and position papers on managing childhood allergies during the COVID-19 pandemic [2–5]. Clinicians' awareness of these and relevant updates enable them to optimize patient care. With optimal asthma control, admissions to emergency services and the risk of being infected with SARS-CoV-2 are minimized for patients and their caregivers, which enables the efficient use of health facilities and the labor force of health professionals.

The aim of this study was to evaluate the overall knowledge and awareness of pediatricians and family physicians that play active roles in the care of pediatric asthma and allergic rhinitis across Turkey in 4 areas, namely, relationships among COVID-19 infection risk, asthma/allergic rhinitis, and medications; follow-up and management of asthma/allergic rhinitis according to recommendations updated during the pandemic period; observations and perceptions of pediatric asthma patient treatment compliance and attitudes; and attitudes to using telehealth in follow-up and management.

Method

We conducted a national cross-sectional survey study among pediatricians and family physicians in Turkey. We used a structured, self-reporting, anonymous online survey, employing the online survey tool "OnlineAnketler®" (<https://www.onlineanketler.com>, Enuvo GmbH; Zurich, Switzerland) to create and conduct the survey. Participant browser session identification was locked, and a cookie was set to prevent multiple submissions.

Table 1. Demographic characteristics of respondents

Age, mean $\pm$ SD, yr	41.2 $\pm$ 8.6
Gender <i>n</i> (%)	
Female	180 (52)
Specialty, <i>n</i> (%)	
Family physician	113 (32.7)
Pediatrician	233 (67.3)
Years in practice, median (IQR)	10 (5–16)
Active participation in care of COVID-19 patients, <i>n</i> (%)	244 (70.5)
Clinical setting of pediatricians, <i>n</i> (%)	
Primary	27 (11.7)
Secondary	97 (42)
Tertiary	107 (46.3)
IQR, interquartile range.	

The questionnaire was constructed by 2 pediatric allergy specialists (P.G.O., V.C.) and designed to evaluate the following 4 items: (1) the relationships among COVID-19 infection risk, pediatric asthma/allergic rhinitis, and medications used for treatment; (2) the follow-up and management of asthma/allergic rhinitis according to the current recommendations and latest information published; (3) the pediatrician and family physician observations and perceptions of their pediatric asthma patients' treatment compliance and attitudes; and (4) the professionals' attitudes to using telehealth in the follow-up and management of pediatric asthma patients during the pandemic.

The survey consisted of 37 questions: 7 questions gathered demographic data (Table 1), while the other 30 asked about the 4 items mentioned (Tables 2–4). The guidelines of the European Academy of Allergy and Clinical Immunology and Global Initiative for Asthma were used to prepare the survey questions about the knowledge and awareness of respondents on the relationship between the COVID-19 infection and pediatric asthma/allergic rhinitis [2–5]. An online survey link was sent to WhatsApp and Telegram groups that included pediatricians and family physicians across Turkey. The recipients were allowed to further forward the survey to their colleagues.

The survey link was sent in January 2021 and it was sent again in February; responses were due by the end of March 2021. Study participants were enrolled after obtaining informed consent. An information and an approval box featured at the beginning of online survey. Participants were informed in detail about the purpose and method of the study; whoever was willing to participate in the study ticked the approval box before proceeding. The time required to complete the questionnaire was approximately 10 min. Our study data were obtained from completed questionnaires.

A five-point Likert scale was used for the answers, comprising "strongly agree," "agree," "undecided," "disagree," and "strongly disagree" for the questions on items 1–3 (questions 1–24) and "always," "often," "sometimes," "rarely," and "never" on item 4 (questions 25–30). An overall "knowledge score" was calculated by collecting correct answers to questions 1–15. These were defined as "strongly agree/agree" for questions 12–13 and "disagree/strongly disagree" for the other questions. Correct answers were counted as 1 point.

Table 2. Overall knowledge and awareness of respondents about COVID-19 infection risk and pediatric asthma/allergic rhinitis, follow-up, and management according to the current recommendations and latest updates

Question (correct response)	Specialty			Clinical setting of pediatricians		
	family physician, n (%)	pediatrician, n (%)	p value	primary and secondary, n (%)	tertiary, n (%)	p value
1 – All asthmatic children are at increased risk of COVID-19 infection. (disagree/strongly disagree)	7 (6.2)	52 (22.3)	<0.001	26 (21)	26 (24.3)	0.54
2 – All children with allergic rhinitis are at increased risk of COVID-19 infection. (disagree/strongly disagree)	30 (26.5)	95 (40.8)	0.01	50 (40.3)	44 (41.1)	0.90
3 – Asthma medications lead to susceptibility to COVID-19 infection. (disagree/strongly disagree)	75 (66.4)	190 (81.5)	0.002	108 (87.1)	80 (74.8)	0.016
4 – Inhaled corticosteroids may lead to a more severe course of COVID-19 infection. (disagree/strongly disagree)	63 (55.8)	193 (82.8)	<0.001	105 (84.7)	86 (80.4)	0.38
5 – Montelukast may lead to a more severe course of COVID-19 infection. (disagree/strongly disagree)	70 (61.9)	190 (81.5)	<0.001	106 (85.5)	82 (76.6)	0.08
6 – LABA may lead to a more severe course of COVID-19 infection (disagree/strongly disagree)	72 (63.7)	198 (85.0)	<0.001	111 (89.5)	85 (79.4)	0.03
7 – Antihistamines may lead to a more severe course of COVID-19 infection. (disagree/strongly disagree)	88 (77.9)	203 (87.1)	0.02	110 (88.7)	91 (85.0)	0.40
8 – Intranasal corticosteroids may lead to a more severe course of COVID-19 infection. (disagree/strongly disagree)	71 (62.8)	183 (78.5)	0.002	99 (79.8)	82 (76.6)	0.55
9 – Systemic corticosteroids should not be used in the treatment of asthma exacerbations during the pandemic. (disagree/strongly disagree)	80 (70.8)	216 (92.7)	<0.001	112 (90.3)	102 (95.3)	0.14
10 – Salbutamol should not be used in the treatment of asthma exacerbations during the pandemic. (disagree/strongly disagree)	78 (69.0)	196 (84.1)	0.001	108 (87.1)	86 (80.4)	0.16
11 – A nebulizer should be preferred first in order to apply a bronchodilator to an asthmatic patient diagnosed with COVID-19 infection. (disagree/strongly disagree)	33 (29.5)	178 (76.4)	<0.001	100 (80.6)	78 (72.9)	0.16
12 – A spacer should be preferred first in order to apply a bronchodilator to an asthmatic patient diagnosed with COVID-19 infection. (agree/strongly agree)	55 (49.1)	198 (85.0)	<0.001	112 (90.3)	84 (78.5)	0.012
13 – Flu vaccine should be administered to pediatric asthma patients during pandemic. (agree/strongly agree)	101 (90.2)	227 (97.4)	0.004	123 (99.2)	102 (95.3)	0.06
14 – Routinely respiratory function tests should be performed during the pandemic. (disagree/strongly disagree)	22 (19.6)	75 (32.2)	0.01	37 (29.8)	37 (34.6)	0.44
15 – Asthmatic children should not attend school during the pandemic. (disagree/strongly disagree)	63 (56.3)	157 (67.4)	0.04	88 (71)	68 (63.6)	0.23
Overall knowledge score (mean ± SD)	8.07±3.0	10.9±2.5	<0.001	11.2±2.2	10.5±2.7	0.051
LABA, long-acting beta-agonists; SD, standard deviation.						

Table 3. Observations and perceptions of respondents about COVID-19 and pediatric asthma

Question*	Specialty			Clinical setting of pediatricians		
	family physician, n (%)	pediatrician, n (%)	p value	primary and secondary, n (%)	tertiary, n (%)	p value
16 – I Can distinguish between an asthma attack and lung involvement of COVID-19 infection in an asthmatic patient	58 (51.3)	157 (67.4)	0.004	86 (69.4)	69 (64.5)	0.43
17 – I think that patients have better compliance with their controller asthma therapy now than before the pandemic	62 (55.4)	112 (48.1)	0.20	59 (47.6)	51 (47.7)	0.99
18 – Admissions of patients due to asthma attacks during the pandemic are lower than in previous years	88 (78.6)	196 (84.1)	0.20	110 (88.7)	85 (79.4)	0.53
19 – Asthmatic children can be vaccinated with additional pneumococcal vaccine for given indications during pandemic	40 (35.7)	68 (29.2)	0.22	44 (35.5)	24 (22.4)	0.03
20 – I think the families of patients asthmatic children have been much more willing to have their children vaccinated against flu during the pandemic	87 (77.7)	175 (75.1)	0.60	96 (77.4)	77 (72)	0.34
21 – I know which types and the contents of hand disinfectants that should be used by asthmatic patients	26 (23.2)	76 (32.6)	0.07	41 (33.1)	33 (30.8)	0.71
22 – I know which types of masks should be preferred by pollen-allergic asthmatic patients	43 (38.4)	103 (44.2)	0.30	57 (46)	45 (42.1)	0.55
23 – I think telehealth is useful in the management of asthmatic children during the pandemic	51 (45.5)	115 (49.4)	0.50	54 (43.5)	60 (56.1)	0.58
24 – I think it is wrong to manage asthmatic patients without face-to-face visit even in situations that do not require physical examination	36 (32.1)	91 (39.1)	0.21	41 (33.1)	50 (46.7)	0.03

* Answers: agree/strongly agree.

We performed statistical analysis using the IBM SPSS Statistics for Windows, V.25.0 (IBM, Armonk, NY, USA) software. We used descriptive statistics to summarize the responses to the different questions and present the results of different subgroups. Statistical significance between the subgroups was assessed using the χ^2 test (Pearson, Yates, or Fisher exact). A *p* value of less than 0.05, two-sided, was considered statistically significant.

Results

Demographic Characteristics of Respondents

A total of 346 participants responded to the survey, comprising 113 (32.7%) family physicians and 233 (67.3%) pediatricians working in 52 provinces (from a total of 81 provinces nationwide). They represented 2.8% of family physicians and 4.6% of pediatricians in Turkey (totaling 4,035 and 5,065, respectively). Of the respondents, 70.5% stated that they actively participate in the care of COVID-19 patients (Table 1).

Overall Knowledge and Awareness of Respondents about COVID-19 Infection Risk and Pediatric Asthma/Allergic Rhinitis, Follow-Up, and Management According to Current Recommendations

The overall knowledge score of the pediatricians was higher than that of the family physicians (10.9 ± 2.5 vs. 8.07 ± 3.0 , $p < 0.001$). The overall knowledge score of pediatricians was not statistically different according to the clinical setting where they were working, characterized as primary or secondary versus tertiary (11.2 ± 2.2 vs. 10.5 ± 2.7 , $p = 0.051$). The percentages of all respondents who knew that there is no increased risk of COVID-19 infection for all children with asthma and with allergic rhinitis were, respectively, less than 25% and 26.5 (family physicians) to 41.1% (pediatricians working in tertiary settings).

The proportions of respondents who were aware that asthma medications do not lead to susceptibility to COVID-19 infection ranged between 66.4% (family physicians) and 87.1% (pediatricians working in a primary or secondary clinical setting). The proportion of pediatri-

Table 4. Attitudes of respondents to using telehealth in the follow-up and management of pediatric asthma patients during the COVID-19 pandemic (where physical examination is unnecessary)

Question*	Specialty			Clinical setting of pediatricians		
	family physician, n (%)	pediatrician, n (%)	p value	primary and secondary, n (%)	tertiary, n (%)	p value
25 – I prefer talking on the phone	16 (14.3)	49 (21.1)	0.12	26 (21)	23 (21.5)	0.92
26 – I prefer to use SMS/WhatsApp	10 (8.9)	30 (12.9)	0.27	14 (11.3)	16 (15)	0.40
27 – I prefer social media	4 (3.6)	17 (7.3)	0.17	8 (6.5)	9 (8.4)	0.57
28 – I prefer FaceTime/video chat	2 (1.8)	23 (9.9)	0.007	11 (8.9)	12 (11.2)	0.55
29 – I prefer e-mail	2 (1.8)	10 (4.3)	0.35	3 (2.4)	7 (6.5)	0.19
30 – I prefer face-to-face visits even in situations that do not require physical examination	84 (75.0)	176 (75.5)	0.91	101 (81.5)	74 (69.2)	0.03

SMS, Short Message Service. * Answers: always/often.

cians who answered this item correctly was higher for those working in a primary or secondary clinical setting than for those in a tertiary clinical setting ($p = 0.016$). The proportions of the grouped participants who knew that in the treatment of asthma exacerbation, there is no reason to avoid using systemic corticosteroid and salbutamol were 70.8–95.3% and 69–87.1%, respectively.

That a spacer should be preferred first before applying a bronchodilator to an asthmatic patient diagnosed with COVID-19 infection was known by half of the family physicians and 85% of the pediatricians. The proportion of primary and secondary clinical setting pediatricians who answered this item correctly was higher than that of the tertiary clinical setting pediatricians ($p = 0.012$).

The item related to not-performing routine respiratory function tests was the least well known. Only 19.6% of family physicians and 32.2% of pediatricians answered this correctly (Table 2).

Observations and Perceptions of Respondents about COVID-19 and Pediatric Asthma

The percentage of pediatricians who thought they could distinguish between an asthma attack and lung involvement of COVID-19 infection in an asthmatic patient was significantly higher than that of family physicians (67.4% vs. 51.3%, $p = 0.004$). Some 48.1% of the family physicians and 55.4% of the pediatricians thought that patients had better compliance with their controller asthma therapy during the pandemic than before the pandemic. Also, 78.6% of the family physicians and 84.1% of

the pediatricians thought that admissions of patients due to asthma attacks during the pandemic were lower than in the years before.

Most respondents did not know which types of hand disinfectants and masks should be used with asthmatic patients. The proportions of the grouped respondents who thought telehealth is useful in the management of asthmatic children during the pandemic ranged between 43.5% and 56.1%. The proportions who thought it is wrong to manage asthmatic patients without face-to-face visits even in situations that do not require physical examination ranged between 32.1% and 46.7% (Table 3).

Attitudes of Respondents to Using Telehealth in the Follow-Up and Management of Pediatric Asthma Patients During the COVID-19 Pandemic (When Physical Examination is Unnecessary)

Of the respondents, 75% stated that they prefer face-to-face visits even in situations that do not require a physical examination. Less than 25% preferred talking on the phone or using Short Message Service/WhatsApp, social media, FaceTime/video chat, or email when following up their patients (Table 4).

Discussion

To the best of our knowledge, this is the first study to evaluate the knowledge, awareness, perceptions, and attitudes of pediatricians and family physicians about the

management of asthma and allergic rhinitis during the COVID-19 pandemic. Our results revealed that there are many gaps in the knowledge and awareness of physicians taking an active role in the care of pediatric asthma/allergic rhinitis across Turkey. The overall knowledge score of family physicians was significantly lower than that of pediatricians. The practical attitudes to using telemedicine were far from recent recommendations.

The proportions of all the respondents knowing that there is no increased risk of COVID-19 infection among all children with asthma and with allergic rhinitis were under 25% and about 40%, respectively. Only uncontrolled asthma is a severe COVID-19 risk factor [2–4]. Patients with common allergic diseases do not develop distinct symptoms or severe outcomes; allergic children show a mild course, similar to non-allergic children [4, 6].

More than a third of the family physicians questioned and about a fifth of the pediatricians were unaware that asthma medication does not lead to susceptibility to COVID-19 infection. The available scientific evidence indicates that allergy treatments do not increase either susceptibility to SARS-CoV-2 infection or severity of COVID-19 disease [2–5]. Patients with allergic asthma, allergic rhinitis, or other allergy conditions should therefore be treated according to the usual guidelines, without restricting the use of any particular medication [3]. Proper management and background controller treatment should be continued as prescribed [2]. Proper treatment of these diseases might prevent unnecessary visits to physicians and hospitals and thus reduce the risk of being exposed to the SARS-CoV-2 virus. Other commonly prescribed allergy medicines, such as antihistamines, bronchodilators, and leukotriene receptor antagonists, have also not been reported as risk factors in any studies on SARS-CoV-2 virus infections and should thus not be considered as increasing the risk of COVID-19 [3]. Furthermore, the use of biologicals in the treatment of bronchial asthma, atopic dermatitis, chronic rhinosinusitis with nasal polyps, and spontaneous urticaria should be continued as usual in patients without suspected infection or proven SARS-CoV-2 infection [6, 7].

Physicians had concerns about using systemic corticosteroids for an acute asthma attack during the early days of the pandemic. The Global Initiative for Asthma [8] and the British Thoracic Society [9] do not recommend stopping oral steroids for the management of asthma if the individual is already taking these medications and do not recommend avoiding oral steroids for an acute asthma attack, even if it is due to COVID-19 [3]. However, our study revealed that a third of family physicians were not aware of

there being no reason to avoid using oral steroids. In fact, the proper management of asthma attack at primary clinical settings has more importance during the pandemic.

Avoiding nebulizers and using a metered-dose inhaler via a spacer for treatment of asthma attacks and, unless absolutely necessary, suspending routine spirometry testing is emphasized in all recently published guidelines [2–5] in order to reduce the risk of viral transmission. However, half of the family physicians and 15% of the pediatricians here were unaware that a spacer should be used before applying a bronchodilator in an asthmatic patient diagnosed with COVID-19 infection, and about 80% of the family physicians and nearly 70% of the pediatricians did not know the recommendation on routine spirometry testing. These were striking outputs of our study in the context of the safe management of childhood asthma during the COVID-19 pandemic.

Interestingly, the number of pediatricians who knew that asthma medications do not lead to susceptibility to COVID-19 infection and about using a spacer was higher among those working in a primary or secondary clinical setting than those in a tertiary clinical setting. We think that such difference may result from the fact that the former group encounter more patients and thus feel a greater obligation to be up to date than those at a tertiary clinical setting, who are more specialized and working in departments other than pediatric allergy clinics.

Distinguishing an asthma attack and lung involvement in COVID-19 infection in an asthmatic patient is critical, not only for their proper management and timely treatment but also for the psychological status of patients with allergies, all the more so since the general population is highly sensitive to the perception of people showing respiratory symptoms during the COVID-19 pandemic, which increases the risk of stigmatization of allergy patients, further enhancing their psychosocial stress [2]. In our study, more than a third of pediatricians and about half of family physicians stated that they do not think they can distinguish 2 situations. This is, in fact, is a highly challenging clinical scenario as it can be virtually impossible to distinguish the 2 situations; however, the management is still to treat the underlying asthma and bronchospasm, to exclude the concomitant COVID-19 infection, and to implement quarantine protocols in light of positive tests, as required by local authorities if relevant.

That suitable types of hand disinfectants and masks should be used with asthmatic patients was known by less than half of all respondents. Although the recommendation of N95 masks in pollen-allergic or asthmatic patients is controversial and not currently listed in many organi-

zational guidelines (e.g., EAACI-ARIA guidelines make no specific mention), N95 facial masks have been recommended for preventing allergic rhinitis symptoms during the COVID-19 pandemic [4, 10] as these masks have proven to be useful in reducing allergen exposure by blocking pollen access to the nose and mouth. Surgical masks, in contrast, do not protect against the inhalation of small airborne contaminants and are not designed to seal tightly against the user's face, so contaminated air can pass through the gaps [4, 10]. Non-irritant soap substitutes are recommended [2], and patients should be informed accordingly.

A clear drop in emergency visits for asthma of all severities during the COVID-19 pandemic has been reported in several countries [11–15]. About half of our respondents thought that patients had better compliance with their controller asthma therapy during than before the pandemic, while most thought that admissions of patients due to asthma attacks during the pandemic were lower during the pandemic than in previous years and reported that the families of asthmatic children have been much more willing to have their children vaccinated against flu. Various exacerbating factors, such as decreased physical activity, increased exposure to indoor air and allergens, and decreases in outpatient visit availability, combined with ameliorating factors, such as absence of school exposure along with mask using and social distancing, decreases in outdoor air exposure and increases in general outdoor air quality, and improved adherence to regular treatments are all possible factors that have impacted on asthma control during the pandemic.

Most countries affected by COVID-19 have opted for nationwide confinement, which means that communication with the primary clinician is often performed by telemedicine [3]. Indeed, telehealth technologies were being used in the allergy field even before the pandemic. Patient communications can occur via telephone, telemedicine/video, email, and texting apps. Educational outreach messages and televisits can include instructions on allergen avoidance, indoor air purifiers, and proper medication use (e.g., reviewing the appropriate use of inhalers with spacers) [2]. Pre-visit telephonic communication is helpful in screening for patients with potential SARS-CoV-2 infection [15]. In-person consultations should be minimized to the lowest necessary level and triaged by telemedicine whenever possible, as emphasized in all recent guidelines [2–5, 16]. However, near half of all respondents in our study did not think telehealth is useful in the management of asthmatic children during the pandemic. Furthermore, over a third of all respondents thought it is wrong to man-

age asthmatic patients without face-to-face visits, even in situations that do not require a physical examination, and over three-quarters stated that they prefer face-to-face visits in their practice, even in situations that do not require a physical examination. We think that there may be 2 reasons for these responses: one is physicians and pediatricians not trusting the statements of caregivers or families about a patient's actual health situation; the other is professionals not feeling confident about using electronic communication systems, which may be due to insufficient information about national data security and protection laws. It could also depend on the expertise and comfort level of the individual physician and the baseline asthmatic status of the patients. Stable asthmatic patients can be evaluated by telehealth, when only medication refills may be necessary, while unstable/brittle asthmatics are best seen in person when physical examination is critical.

Our study has 3 limitations. First, it was based on a nonstandard questionnaire. Second, the study population did not reflect all family physicians and pediatricians, so our findings may not be generalizable or applicable to all those physicians that take an active role in the management of childhood asthma and allergic rhinitis. Third, it is also possible selection bias exists: survey participants who agreed to participate may have been self-selected for better knowledge about some of the topics than those who did not participate. A strength of our study was that it clearly demonstrated the gaps in knowledge and awareness of respondents about the management of airway allergies during the pandemic period according to the recommendations and information available in recent guidelines. Another strength was that the study was not performed in a selected area; participants worked in all regions of the country.

Conclusion

The overall knowledge and awareness, especially of family physicians but also of pediatricians, about the management of pediatric asthma and allergic rhinitis during the pandemic is not at a satisfactory level. This can result in the improper treatment of patients. The practice of and attitudes to using telemedicine for the triage and management of these patients is particularly far from what it should be. There is an urgent need to make efforts to inform family physicians and pediatricians in Turkey about the recommendations and updates in recent guidelines published by allergy organizations. This effort will be important not only for optimal disease control but also

to minimize admissions to emergency services and consequently the risk of being infected with SARS-CoV-2 for patients and their caregivers. It will also facilitate the effective use of health facilities and the labor force of health professionals during this critical period.

Acknowledgment

We are thankful to the pediatricians and family physicians who participated in our study.

Statement of Ethics

This study protocol was reviewed and approved by the Trakya University Ethical Committee (Approval No. TUTF/BAEK 2021/07). Study participants were enrolled after obtaining informed consent. An information and an approval box featured at the beginning of online survey. Participants were informed in detail about the purpose and method of the study; whoever was willing to participate in the study ticked the approval box before proceeding.

References

- Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatr.* 2020;109(6):1088–95.
- Pfaar O, Klimek L, Jutel M, Akdis CA, Bousquet J, Breiteneder H, et al. COVID-19 pandemic: practical considerations on the organization of an allergy clinic – an EAACI/ARIA position paper. *Allergy.* 2021 Mar; 76(3):648–76.
- Brough HA, Kalayci O, Sediva A, Untermayr E, Munblit D, Rodriguez Del Rio P, et al. Managing childhood allergies and immunodeficiencies during respiratory virus epidemics – the 2020 COVID-19 pandemic: a statement from the EAACI-section on pediatrics. *Pediatr Allergy Immunol.* 2020 Jul;31(5):442–8.
- Riggioni C, Comberiati P, Giovannini M, Agache I, Akdis M, Alves-Correia M, et al. A compendium answering 150 questions on COVID-19 and SARS-CoV-2. *Allergy.* 2020 Oct;75(10):2503–41.
- Global Initiative for Asthma. *COVID-19: GINA answers to frequently asked questions on asthma management.* 2020 [cited 2020 May 2]. Available from: <https://ginasthma.org/covid-19-gina-answers-to-frequently-asked-questions-on-asthma-management/>.
- Vultaggio A, Agache I, Akdis CA, Akdis M, Baybek S, Bossios A, et al. Considerations on biologicals for patients with allergic disease in times of the COVID-19 pandemic: an EAACI statement. *Allergy.* 2020;75(11):2764–74.
- Klimek L, Pfaar O, Worm M, Eiwegger T, Hagemann J, Ollert M, et al. Use of biologicals in allergic and type-2 inflammatory diseases during the current COVID-19 pandemic: position paper of Ärzteverband Deutscher Allergologen (AeDA)A, Deutsche Gesellschaft für Allergologie und Klinische Immunologie (DGAKI)B, Gesellschaft für Pädiatrische Allergologie und Umweltmedizin (GPA)C, Österreichische Gesellschaft für Allergologie und Immunologie (ÖGAI)D, Luxemburgische Gesellschaft für Allergologie und Immunologie (LGAI)E, Österreichische Gesellschaft für Pneumologie (ÖGP)F in co-operation with the German, Austrian, and Swiss ARIA groupsG, and the European Academy of Allergy and Clinical Immunology (EAACI)H. *Allergologie Select.* 2020 Sep 7;4:53–68.
- Dong X, Cao YY, Lu XX, Zhang JJ, Du H, Yan YQ, et al. Eleven faces of coronavirus disease 2019. *Allergy.* 2020 Jul;75(7):1699–709.
- British Thoracic Society. *Advice for healthcare professionals treating patients with asthma* [cited 2020 Apr 5]. Available from: <https://www.brit-thoracic.org.uk/docum-ent-library/quality-improvement/covid-19/bts-advice-for-healthcare-professionals-treating-patients-with-asthma/>.
- OSHA. *COVID-19 – control and prevention* [cited 2020 May 24]. Available from: <https://www.osha.gov/SLTC/covid19/controlprevention.html>.
- Oreskovic NM, Kinane TB, Aryee E, Kuhlthau KA, Perrin JM. The unexpected risks of COVID-19 on asthma control in children. *J Allergy Clin Immunol Pract.* 2020 Sep;8(8):2489–91.
- Kenyon CC, Hill DA, Henrickson SE, Bryant-Stephens TC, Zorc JJ. Initial effects of the COVID-19 pandemic on pediatric asthma emergency department utilization. *J Allergy Clin Immunol Pract.* 2020 Sep;8(8):2774–1.
- Gupta A, Bush A, Nagakumar P. Asthma in children during the COVID-19 pandemic: lessons from lockdown and future directions for management. *Lancet Respir Med.* 2020 Nov;8(11):1070–1.
- Krivec U, Kofol Seliger A, Tursic J. COVID-19 lockdown dropped the rate of paediatric asthma admissions. *Arch Dis Child.* 2020 Aug;105(8):809–10.
- WHO. *Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected* [cited 2020 May 24]. Available from: [https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-\(ncov\)-infection-is-suspected-20200125](https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125).
- Portnoy J, Waller M, Elliott T. Telemedicine in the Era of COVID-19. *J Allergy Clin Immunol Pract.* 2020;8(5):1489–91.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Pinar Gokmirza Ozdemir: conceptualization (lead); methodology (lead); data curation (lead); formal analysis (lead); writing – original draft, review, and editing (lead). Velat Celik: methodology (supporting); data curation (supporting); formal analysis (supporting); writing – review and editing (supporting).

Data Availability Statement

The data that support the findings of this study are not publicly available due to their containing information that could compromise the privacy of research participants but are available from the corresponding author.