# Complementary and Alternative Medicine Use in Children with Respiratory Allergies: If You Don't Ask, You'll Never Know

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## ABSTRACT

**Objective:** Complementary and alternative medicine (CAM) is widely used in children with respiratory allergies. The purpose of this study was to evaluate the use of CAM practices among children with asthma and allergic rhinitis (AR) and to determine the risk factors associated with CAM use.

**Materials and Methods:** A questionnaire, which consisted of 3 parts with 31 structured items, including demographic variables, the asthma- and/or AR-related characteristics, and CAM modalities was administered to the parents of 210 children with asthma and/or AR. The relationship between asthma control and CAM usage was evaluated by Asthma Control Tests (ACT) and the Pediatric Asthma Quality of Life Questionnaires (PAQLQ).

**Results:** Of the children, 79.1% had used at least one type of CAM within the last 6 months. Honey products, ginger, carob and mint with lemon were the most preferred forms of CAM. Presence of a family history of atopic diseases, maternal and paternal ages, and emergency department visits in the last year were significantly associated with CAM use (p=0.002, p=0.013, p=0.047, and p=0.001, respectively). The main reasons for CAM usage were frequent upper respiratory tract infections, long-term treatment of asthma and/or AR, and recurrent episodes of asthma exacerbations. Only 34.8% of the parents informed their physicians about their children's CAM use.

**Conclusion:** The prevalence of CAM use was prevalent among children with asthma and/or AR. Healthcare professionals should be aware of the tendency for the use of CAM in children with respiratory allergies and should enquire the CAM history during the follow-up visits.

**Keywords:** Allergic rhinitis, asthma, asthma control test, complementary and alternative medicine, quality of life

## INTRODUCTION

Asthma and allergic rhinitis (AR) are among the most common chronic disorders of both childhood and adulthood. Allergen avoidance and various anti-mediator, anti-inflammatory, and monoclonal antibody treatments in addition to reliever medications and allergen specific immunotherapy have found a place and approval as conventional strategies for the management of these diseases (1-4). It is well-known that patients with asthma and/or AR may have difficulties in compliance with these long-term conventional therapies (1, 2). Adherence problems to prescribed medications and treatment plans, and search for alternatives may lead to serious health outcomes. Poor control of asthma and AR may have both early and late consequences on the health and quality of life of the patients, which can be exemplified as increased emergency department (ED) visits, hospitalizations, as well as increased health-related costs, morbidity and mortality (1, 2).

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The term of '*complementary and alternative medicine*' (CAM) is defined by the National Center for Complementary and Alternative Medicine as a broad spectrum group of healthcare practices, products, and therapies that are not an integral part of current conventional medicine (5). There is a rising trend about the use of CAM modalities in children with respiratory allergies (6, 7). Several studies have evaluated the prevalence and modalities of CAM usage in children with asthma and AR, but only a few of them have investigated the relationship between CAM usage and its associated risk factors such as disease control, conventional treatments, and quality of life (8-15).

The use of CAM may possibly lead to poor compliance with conventional therapies or even replacement of standard care (16, 17). Also, CAM is generally considered 'safe' because it is perceived as 'natural' by the parents, despite some reports of serious reactions (18-20). There is no large-scale study performed about the efficacy and safety of CAM use in respiratory allergies. The primary objective of this study is to evaluate the use of CAM in addition to conventional medical therapies among children with respiratory allergies, and its effects on disease control and quality of life. Furthermore, we also aimed to investigate the reasons/motivations for CAM use and any reported adverse events during the use of CAM.

## MATERIALS and METHODS

### Study Population

The study was designed as a cross sectional study. During the 6-month period, parents and children were invited to participate in this questionnaire-based study during their routine outpatient visits. The study subjects were children with asthma and/or AR, aged 1 to 18 years, who were followed-up in the Istanbul University, Istanbul Faculty of Medicine, Division of Pediatric Allergy and Immunology. The follow-up periods of the patients were not taken into account for participation in the study. Children with a history of preterm delivery (<37 weeks), primary immunodeficiency, and any other chronic disease were excluded from the study. All patients and/or their parents were informed about the study and written informed consent forms were obtained. The Ethics Committee of Istanbul University, Istanbul Faculty of Medicine approved the study protocol (No:2020/894).

### Questionnaire

The questionnaire consisted of 3 parts (*i.* demographic data, *ii.* disease related data, and *iii.* CAM data) with 31 structured items. The first part included questions about the demographic characteristics of the patients and their families. The second part focused on the allergic diseases including the diagnosis, follow-up duration, and current medical treatment. In this part, compliance with the medical treatment, inhalation techniques for asthma patients, indicators of the disease severity (need for systemic steroids within the past year, ED visits, hospitalizations and intensive care unit (ICU) admissions), annual influenza vaccination status, and regular physical activity habits were queried. Inhalation techniques were observed during the questionnaire by the same physicians. The technique was defined as "incorrect" if the patients and/or parents had any errors that could reduce or lose the dose of drug delivery. Contrarily, correct inhalation technique was defined as error-free application. Compliance of the asthma medications was assessed by the patients' and/or parents' self-report over a period of the last month. We classified the patients that used prescribed medicine daily as "regular users" and those with poor adherence to the prescribed medicine as "irregular users". Skin prick and pulmonary function tests results of the patients were retrieved from their medical records. The aim of the third part of the questionnaire was to investigate the CAM modalities and the preference for their use in the last 6 months. Information sources and perceived effectiveness/opinions for CAM, the presence of any conversation with a healthcare professional about CAM use, and any adverse effects of CAM were assessed. CAM modalities other than the structured questions were also considered.

The patients' asthma and AR severity was classified by the physicians according to the Global Initiative for Asthma (GINA) and the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines, respectively (1, 21). The validated Turkish versions of the Asthma Control Test (ACT) for children over 12 years of age and the validated Turkish version of the Childhood Asthma Control Test (C-ACT) for children 4-11 years of age were performed to assess the patients' asthma (22, 23). If the total scores for ACT and C-ACT were more than 19, the patient's asthma was considered as "controlled asthma" (24). Additionally, the validated Turkish version of the Pediatric Asthma Quality of Life Questionnaire (PAQLQ) was administered to the asthmatic children aged between 7 and 17 years (25)

to assess activity, symptom, and emotional domains. The domain scores were calculated from the mean score of equally weighted items and the total PAQLQ score was calculated from the mean score of all the items. The higher scores indicated better quality of life.

The questionnaires were filled out by the patients and/or parents under supervision of the same two authors of this study. ACT, C-ACT, and PAQLQ were primarily answered by the children. Parents assisted their children when they had difficulty in answering the questions.

### Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) software (Version 26.0. Armonk, NY) was used for the statistical analysis of the variables obtained. The normality of the distribution of continuous variables was evaluated with skewness-kurtosis and the Kolmogorov-Smirnov test or the Shapiro-Wilk test. The participants were divided into two groups as CAM users and CAM non-users. Descriptive statistics of categorical and numerical variables of the groups were expressed as frequencies and means with standard deviation for normally distributed variables or as medians with minimum-maximum values in parentheses for non-normally distributed variables. Variables were compared between groups with Student's t test for values with a normal distribution and the Mann–Whitney U test for values with a non-normal distribution. Pearson's Chi-Square or Fisher's exact tests were used to compare categorical variables between groups. All $p$ values <0.05 were considered as statistically significant.

### RESULTS

### Demographic Characteristics of the Patients and Their Families

The questionnaires were completely filled by 210 participants with asthma and/or AR. Twenty-one parents did not complete the study. The overall response rate was 90.9%. The mean age of the patients was $10.0 \pm 4.0$ years and 59.5% of them were male. Of the respondents, 79.1% (n=166) had used some CAM modalities within the last 6 months. Although children treated with CAM were younger than CAM non-users ($p$=0.005), the CAM usage rates of the patients were similar when they were further subclassified according to their age as 1-5 years, 6-11 years, and over 12 years (78.4%; %76.7, and 82.9% respectively). A history of atopic diseases of the parents and siblings,

and the maternal and paternal ages were found to be significantly associated with CAM use ($p$=0.002, $p$=0.013, $p$=0.047, respectively). The most common allergic diseases reported in the family members were asthma and allergic rhinitis (n=73, 53.3%, and n=78, 56.9%, respectively), (Table I).

### Asthma- and/or Allergic Rhinitis-Related Characteristics of the Patients

Both asthma and AR were diagnosed in 60.5% (n=127) of the participants, whereas 9.5% (n=20) had asthma and 30% (n=63) had AR only. There was no statistically significant difference in terms of the severity of asthma and AR between CAM-users and non-users. Only two patients had severe asthma: one of them was a CAM user and the other was not. Most of the asthma patients in both groups stated that they used their conventional medications regularly with the correct inhalation techniques. Although ED visits were significantly higher in the CAM users than non-users ($p$=0.001), no significant difference was observed between the two groups in terms of systemic steroid use for asthma attacks, hospitalization, and ICU stays during the previous year. Most of the children with positive skin test results had house dust mite sensitization (n=124, 89.2%) and predicted $FEV_1$ values were within normal levels. Skin prick test results and predicted $FEV_1$ values did not significantly differ between the two groups. Additionally, asthma control as assessed by ACT and C-ACT and the quality of life of the patients as measured by PAQLQ did not differ between the two groups. The disease-related characteristics of the CAM users and non-users are presented in Table II.

### CAM Modalities and CAM-Related Characteristics of the Patients and Their Families

Nutritional and herbal products (NHP) were the most commonly preferred CAM modalities (n=160, 96.4%) in our study population. Honey products, ginger, carob, and mint with lemon were the most common forms of NHP, both in asthma and AR patients. Use of CAM modalities other than NHP was relatively rare (n=34, 20.5%). The most frequent of these were salt lamps, salt rooms, and thermal hydrotherapies. These modalities of CAM were preferred by asthma patients rather than AR patients. Besides, 65.7% (n=138) of the parents reported that they had used one of the CAM modalities for themselves. Among them 93.5% (n=129) preferred a similar NHP to the one they used in their children

**Table I: Demographic characteristics of patients and their families.**

| | CAM users (n=166) | CAM non-users (n=44) | *p*-value |
|---|---|---|---|
| **Age (years), mean ± SD** | 9.7± 3.9 | 11.6 ± 4.0 | 0.005 |
| **Gender, n (%)** | | | 0.532 |
| Male | 97 (58.4) | 28 (63.6) | |
| Female | 69 (41.6) | 16 (36.4) | |
| **Additional atopic diseases, n (%)** | | | 0.496 |
| No | 132 (79.5) | 37 (84.1) | |
| Yes | 34 (20.5) | 7 (15.9) | |
| **Family history for atopic diseases, n (%)** | | | **0.002\*** |
| Yes | 117 (70.5) | 20 (45.4) | |
| No | 49 (29.5) | 24 (54.6) | |
| **Age of the mother (years), mean ± SD** | 37.8 ± 6.2 | 40.6 ± 7.1 | **0.013\*** |
| **Education level of the mother, n (%)** | | | 0.215 |
| No formal education or primary school | 84 (50.6) | 20 (45.5) | |
| Middle school | 21 (12.7) | 11 (25.0) | |
| High school | 51 (30.7) | 10 (22.7) | |
| Undergraduate | 10 (6.0) | 3 (6.8) | |
| **Age of the father (years), mean ± SD** | 42.0 ± 6.0 | 44.1 ± 7.0 | **0.047\*** |
| **Education level of the father, n (%)** | | | 0.929 |
| No formal education or primary school | 65 (39.2) | 15 (34.1) | |
| Middle school | 34 (20.5) | 9 (20.5) | |
| High school | 47 (28.3) | 14 (31.8) | |
| Undergraduate | 20 (12.0) | 6 (13.6) | |
| **Household size (person), n (%)** | | | 0.790 |
| Two or three | 21 (12.7) | 5 (11.4) | |
| Four | 81 (48.8) | 21 (47.7) | |
| Five | 40 (24.1) | 9 (20.5) | |
| ≥ Six | 24 (14.4) | 9 (20.4) | |

**CAM:** Complementary and alternative medicine, **SD:** Standard deviation, * statistically significant.

All participants were asked about the perceived effectiveness or opinions about NHP and other CAM modalities. Of the parents, 73.3% and 35.7% reported that NHP and other CAM modalities are effective or very effective, respectively. Frequent upper respiratory tract infections were the most common reason for CAM usage, followed by children's chronic disease and asthma exacerbations. The participants preferred the same NHPs during URTIs. Only 13.3% (n=28) of the parents initially discussed CAM usage by their physicians, whereas 34.8% (n=73) informed their physicians after CAM usage. None of the participants reported any adverse effects with any of the CAM modalities. Table III presents the most frequently used CAM modalities and other related characteristics of CAM usage.

## DISCUSSION

The results of this study demonstrate that most of the children with respiratory allergies combined their conventional medications with at least one type of CAM modality. Although the most frequently preferred products in our study were honey, ginger, carob, and mint with lemon, the patients have a tendency to use a wide variety of NHPs. Previous reports have highlighted that the use of CAM modalities is a common attitude among children with respiratory allergies (8-14). Socio-cultural heritage and habits affect the use of CAM methods. Therefore, a wide variety of CAM modalities can be used among children with respiratory allergies in different settings and countries (8-17).

**Table II: Asthma and allergic rhinitis related characteristics of patients.**

| | CAM users (n=166) | CAM non-users (n=44) | p-value |
|---|---|---|---|
| **Diagnosis, n (%)** | | | 0.660 |
| Asthma + Allergic rhinitis | 103 (62.1) | 24 (54.6) | |
| Allergic rhinitis | 48 (28.9) | 15 (34.1) | |
| Asthma | 15 (9.0) | 5 (11.3) | |
| **Follow-up duration (years), median, (minimum-maximum)** | 2.1 (0.0-12.7) | 3.9 (0.0-12.2) | 0.071 |
| **Treatment duration (years), median, (minimum-maximum)** | 2.0 (0.0-10.9) | 2.9 (0.1-11.5) | 0.143 |
| **Severity of asthma[†], n (%)** | | | 0.523 |
| Mild | 91 (77.1) | 24 (82.8) | |
| Moderate or severe | 27 (22.9) | 5 (17.2) | |
| **Severity of Allergic rhinitis[‡], n (%)** | **n=151** | **n=33** | 0.831 |
| Mild intermittent | 56 (37.1) | 10 (30.3) | |
| Moderate/severe intermittent | 18 (11.9) | 5 (15.1) | |
| Mild persistent | 56 (37.1) | 12 (36.4) | |
| Moderate/severe persistent | 21 (13.9) | 6 (18.2) | |
| **Treatment compliance and inhalation technique of asthma patients, n (%)** | **n=117** | **n=29** | 0.199 |
| Correct inhalation technique and regular usage of prescribed medicine | 63 (53.8) | 15 (51.7) | |
| Correct inhalation technique and irregular usage of prescribed medicine | 37 (31.6) | 9 (31.0) | |
| Incorrect inhalation technique and regular usage of prescribed medicine | 12 (10.3) | 1 (3.5) | |
| Incorrect inhalation technique and irregular usage of prescribed medicine | 5 (4.3) | 4 (13.8) | |
| | **n=106** | **n=35** | |
| **FEV$_1$ % predicted, mean ± SD** | 96.8 ± 13.4 | 97.7 ± 14.6 | 0.744 |
| **Skin prick test results, n (%)** | | | 0.659 |
| Positive | 106 (63.9) | 33 (75.0) | |
| N/A | 36 (21.7) | 5 (11.4) | |
| Negative | 24 (14.4) | 6 (13.6) | |
| **Treatment need during the last year, n (%)** | **n=110** | **n=11** | |
| Systemic steroid treatment | 37 (33.6) | 4 (36.4) | 0.050 |
| ED visits | 63 (57.3) | 5 (45.4) | **0.001*** |
| Hospitalization | 9 (8.2) | 1 (9.1) | 0.383 |
| ICU administration | 1 (0.9) | 1 (9.1) | N/A |
| **Family CAM use, n (%)** | | | |
| Yes | 117 (70.5) | 21 (47.7) | **0.005** |
| No | 49 (29.5) | 23 (52.3) | |
| **Annual influenza vaccination, n (%)** | | | 0.502 |
| None | 133 (80.1) | 35 (79.5) | |
| Vaccinated before | 23 (13.9) | 8 (18.2) | |
| Each year regularly | 10 (6.0) | 1 (2.3) | |
| **Regular physical activity, n (%)** | | | 0.555 |
| No | 117 (70.5) | 33 (75.0) | |
| Yes | 49 (29.5) | 11 (25.0) | |

**Table II continue**

| | n=45 | n=18 | 0.978 |
|---|---|---|---|
| **ACT score, n, mean ± SD** | 20.1 ± 4.2 | 20.1 ± 4.5 | |
| ≥ 20, mean ± SD | 22.6 ± 1.9 | 22.5 ± 1.7 | 0.935 |
| <20, mean ± SD | 15.6 ± 3.5 | 15.2 ± 4.4 | 0.802 |
| | n=58 | n=11 | |
| **C-ACT score, n, mean ± SD** | 20.1 ± 5.0 | 18.64 ± 4.93 | 0.368 |
| ≥ 20, mean ± SD | 23.5 ± 2.2 | 22.17 ± 1.72 | 0.166 |
| <20, mean ± SD | 15.7 ± 4.1 | 14.40 ± 3.98 | 0.527 |
| | n=70 | n=21 | |
| **Total PAQLQ score, n, mean ± SD** | 5.8 ± 1.1 | 6.0 ± 1.0 | 0.605 |
| Symptoms, mean ± SD | 5.6 ± 1.3 | 5.8 ± 1.2 | 0.443 |
| Emotional functions, mean ± SD | 6.3 ± 1.0 | 6.3 ± 1.0 | 0.771 |
| Activity limitations, mean ± SD | 5.6 ± 1.3 | 5.7 ± 1.1 | 0.981 |

**ACT:** Asthma control test, **C-ACT:** Childhood asthma control test, **CAM:** Complementary and alternative medicine, **ED:** Emergency department, **FEV$_1$:** Forced expiratory volume in 1 second, **ICU:** Intensive care unit, **N/A:** Non-available, **PAQLQ:** Pediatric asthma quality of life questionnaire, **SD:** Standard deviation, *statistically significant, †according to the Global Initiative of Asthma (GINA), ‡according to the ARIA classification

Most of the studies investigating CAM methods used in children with respiratory allergies carried out in Turkey were cross-sectional and questionnaire-based, as in our study. Orhan et al. investigated 304 Turkish asthmatic children in 2002 and they found the most popular forms of CAM were quail eggs, herbal medicine, and Turkish wild honey (13). Hocaoglu-Babayigit reported 500 children with asthma in 2015 and 66% had used CAM. The most popular modalities were herbal medicine, honey, and grape syrup. The most commonly used herbal medicines in this study were linden and ginger (12). Another study carried out in 2018 investigated 100 children with allergic rhinitis and the most commonly used method was herbal treatments, used in 77.7% of the patients (15). The results of these studies show that NHPs and honey products appear to be in the first place in children with respiratory allergies in Turkey.

The widespread use of NHPs is due to the fact that they are mostly considered as 'safe' because they are perceived as 'natural' (6, 14, 20). Concurrent use of conventional medications and NHPs may potentially cause pharmacokinetic and pharmacodynamic interactions and may possibly cause adverse events (18-20). In addition, the efficacy of most of these products have not been proven or approved in respiratory allergies (26, 27). In life-threatening situations, such as asthma exacerbations, it has been reported that patients might prefer to use CAM modalities instead of proven medical treatments (6, 14). Although no

significant difference was observed between CAM users and non-users based on ACT, C-ACT, PAQLQ, and pulmonary function tests, CAM users were found to visit EDs more commonly than non-users. This may be attributed to a tendency to choose home-remedies, which may lead to delayed management of asthma exacerbations.

The findings of our study demonstrated that the prevalence of CAM use among younger children was higher than that of older ones. This may be associated with the higher incidence of upper respiratory tract infections and higher asthma morbidity in this age group (1, 28). A family history of respiratory allergies was found to be significantly higher in CAM users in respect to non-users, and unsurprisingly children with family members who used CAM previously were found to be more likely to use CAM. These findings are in concordance with the characteristics of children and parents including age, health conditions, parents' health-related beliefs, and values and practices (8-14, 29).

Although the NHPs used by family members were similar to those used in their children, CAM modalities other than NHPs were found to be different. Salt lamps and cupping therapy were the most prevalent CAM methods other than NHPs in children and family members, respectively. This may be explained by the parents' belief that the salt lamp is relatively "harmless" compared to the other methods. Although role of the salt lamp on non-specific

**Table III: Complementary and alternative medicine modalities and related characteristics of patients and their families.**

| Types of CAM used by patients (n=166) | | |
|---|---|---|
| Nutritional and herbal products (n=160), n (%) | Honey products (honey, bee milk, pollen, venom, beeswax) | 95 (57.2) |
| | Ginger | 88 (53.0) |
| | Carob (natural, syrup, extract) | 78 (47.0) |
| | Mint + lemon | 77 (46.4) |
| | Linden | 33 (19.9) |
| | Grape molasses | 31 (18.7) |
| | Fish oil | 27 (16.3) |
| | Vitamins + minerals | 25 (15.1) |
| | Quail eggs | 23 (13.9) |
| | Black mulberry | 20 (12.1) |
| | Sage | 16 (9.6) |
| | Black cumin oil | 13 (7.8) |
| | Black pepper | 13 (7.8) |
| | Onion-garlic | 13 (7.8) |
| | Radish | 12 (7.2) |
| | Rose hip | 11 (6.6) |
| | Mix herbal tea | 10 (6.0) |
| | Probiotics | 8 (4.8) |
| | Others | 66 (39.8) |
| Other CAM modalities (n=34), n (%) | Salt lamps | 23 (13.9) |
| | Thermal hydrotherapy | 7 (4.2) |
| | Salt rooms | 6 (3.6) |
| | Cupping therapy | 6 (3.6) |
| | Lead pouring | 2 (1.2) |
| | Acupuncture | 1 (0.6) |
| | Leech therapy | 1 (0.6) |
| | Prayer therapy | 1 (0.6) |
| **Types of CAM used by family members (n=138)** | | |
| Nutritional and herbal products (n=129), n (%) | Ginger | 61 (44.2) |
| | Honey products (honey, bee milk, pollen, venom, beeswax) | 58 (42.0) |
| | Mint + lemon | 54 (39.1) |
| | Carob (natural, syrup, extract) | 46 (33.3) |
| | Linden | 37 (26.8) |
| | Sage | 18 (13.0) |
| | Rose hip | 14 (10.1) |
| | Black mulberry | 13 (9.4) |
| | Vitamins + minerals | 13 (9.4) |
| | Mix herbal tea | 12 (8.7) |
| | Fish oil | 11 (8.0) |
| | Quail eggs | 11 (8.0) |
| | Others | 112 (81.2) |
| Other CAM modalities (n=47), n (%) | Cupping therapy | 35 (25.4) |
| | Leech therapy | 7 (5.1) |
| | Salt lamps | 6 (4.4) |
| | Thermal hydrotherapy | 3 (2.2) |
| | Salt rooms | 2 (1.5) |
| | Prayer therapy | 1 (0.7) |

**Table III continue**

| Perceived effectiveness/opinions (n=210) | | |
|---|---|---|
| Nutritional and herbal products | Harmful | 5 (2.4) |
| n (%) | Ineffective/useless | 28 (13.3) |
| | No idea | 23 (11.0) |
| | Effective/useful | 122 (58.1) |
| | Very effective/ very useful | 32 (15.2) |
| Other CAM modalities | Harmful | 5 (2.4) |
| n (%) | Ineffective/useless | 34 (16.2) |
| | No idea | 96 (45.7) |
| | Effective/useful | 69 (32.9) |
| | Very effective/ very useful | 6 (2.8) |
| **Sources of CAM information (n=166), n (%)** | | |
| Family or friends | | 138 (83.1) |
| Media resources (TV, newspaper etc.) | | 35 (21.1) |
| Internet | | 33 (19.9) |
| Physicians | | 28 (16.9) |
| Pharmacists | | 6 (3.6) |
| **Consultation with a physician, n (%)** | | |
| No | | 137 (65.2) |
| Yes | | 73 (34.8) |
| **Reasons for CAM use (n=166), n (%)** | | |
| During URTI | | 124 (74.7) |
| His/her chronic disease (asthma and/or AR) | | 88 (53.0) |
| During asthma exacerbations | | 40 (24.1) |
| Immunity empowerment | | 40 (24.1) |
| Appetite-stimulant | | 16 (9.6) |
| GI symptoms | | 12 (7.2) |
| Others | | 15 (9.0) |
| **Number of CAM used by patients (n=166)** | | |
| Number of nutritional and herbal products (n=160), n (%) | | |
| 1 | | 24 (15.0) |
| 2 | | 32 (20.0) |
| ≥3 | | 104 (65.0) |
| Number of other CAM modalities (n=34), n (%) | | |
| 1 | | 24 (70.6) |
| ≥2 | | 10 (29.4) |
| **Number of CAM used by family members (n=138)** | | |
| Number of nutritional and herbal products (n=129), n (%) | | |
| 1 | | 18 (13.9) |
| 2 | | 29 (22.5) |
| ≥3 | | 82 (63.6) |
| Number of other CAM modalities (n=47), n (%) | | |
| 1 | | 40 (85.1) |
| ≥ 2 | | 7 (14.9) |
| **Number of reasons for CAM use (n=166), n (%)** | | |
| 1 | | 67 (40.4) |
| ≥ 2 | | 99 (59.6) |

**CAM:** Complementary and alternative medicine, **GI:** Gastrointestinal, **URTI:** Upper respiratory tract infection

airway hyperreactivity and quality of life parameters were reported in a pilot study in mild asthmatics, the efficacy of salt lamps has not been proven in the treatment of asthma (30).

In our study, we also demonstrated that most of the parents obtained information about CAM modalities from sources other than their physicians, which was in line with the results of other studies (8, 10-13, 15, 31). As CAM modalities are not included in the formal education of medicine, physicians are generally not familiar with and do not feel comfortable in discussing CAM with their patients (6). On the other hand, patients may not be able to disclose their children's CAM practices to their physicians due to concerns about a possible judgmental attitude by them (31, 32). To overcome this communication problem, physicians should consider possible CAM usage in their patients.

The results of our study show that CAM usage did not significantly affect ACT, C-ACT, or PAQLQ. However, all of these aforementioned tests rely on recall bias, and objective measurement of pulmonary functions is essential to evaluate the severity of asthma (1). In our study, $FEV_1$ measurements performed in the last 6 months were not different between CAM users and non-users. This can be explained by the fact that most of the patients in both groups had similar disease severity while patients in the CAM user group used these modalities in addition to or in conjunction with their conventional treatments. Although some studies have reported that the use of CAM did not affect compliance with conventional therapies, others have reported that treatment compliance was reduced or inexistent in these patients (6, 10, 16, 17). It was reported that children using CAM modalities had lower influenza vaccination rates (33). In our study, influenza vaccination rates were found to be similar in both groups suggesting that skepticism towards vaccination did not exist in any of the study groups. This finding is also consistent with the conventional treatment approaches of patients using CAM.

This study has several strengths but also some limitations. The data about CAM usage relied on self-reports and therefore responses are potentially subject to a number of biases including recall and individual biases. Adherence to conventional medications of the patients was evaluated according to a self-report rather than a validated questionnaire. Age and follow-up duration heterogenei-

ties of participants may potentially affect our results. It is well known that treatment adherence is low in the adolescent age group. In addition, the duration of chronic diseases may cause patients and/or families to be directed to alternative methods. Finally, the socio-cultural status of a family affects the tendency to use CAM modalities. Although the education level of parents may provide information about the socio-economic status of the family, household income data could contribute positively to the results of the study. Despite these limitations, our findings are important to evaluate different disease severity markers at the same time and to investigate their relationship with CAM use. Another important clinical implication of the study is that it provides a comprehensive overview of CAM in the pediatric population with respiratory allergy, which may help the physicians.

In conclusion, our data shows that patients with respiratory allergies frequently use nutritional and herbal products together with their prescribed conventional medicines. Healthcare professionals should be aware of the trend regarding the use of CAM in children with respiratory allergies. It is reasonable to take the CAM history at the follow-up visits for better understanding the health-related behavior of the patients and management of respiratory allergies.

**Statement of Ethics**

All patients and/or their parents were informed about the study and written informed consent forms were obtained. The Ethics Committee of Istanbul University, Istanbul Faculty of Medicine approved the study protocol (No:2020/894). The study was performed according to the Declaration of Helsinki.

**Conflict of Interest Statement**

There is no conflict of interest statement for any author.

**Author Contributions**

Collected the data: **Zeynep Hizli-Demirkale, Esra Yucel, Sevgi Sipahi-Cimen, Ayse Suleyman, Merve Gezgin,** Edited the manuscript: **Zeynep Hizli-Demirkale, Esra Yucel, Sevgi Sipahi-Cimen, Ayse Suleyman, Merve Gezgin, Cevdet Ozdemir, Zeynep Ulker Tamay,** Supervised the study: **Esra Yucel, Cevdet Ozdemir, Zeynep Ulker Tamay,** Wrote the manuscript: **Zeynep Hizli-Demirkale, Cevdet Ozdemir, Zeynep Ulker Tamay,** Conducted the statistical analysis: **Zeynep Hizli-Demirkale.**

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