Turkish Journal of Pediatric Disease

Original Article

Evaluation of drug allergy awareness and rational drug use among parents of hospitalized pediatric patients

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ABSTRACT

Objective: Adverse drug reactions, including drug allergies, can be life-threatening and are often unpredictable. Identifying whether reactions are drug-related is critical, and obtaining a detailed history from parents is essential, especially in pediatric cases. This study aimed to assess parents' awareness of drug allergies and the rational use of medicines.

Material and Methods: A questionnaire was developed to evaluate the awareness of drug allergies among parents of pediatric patients at Ankara Bilkent City Hospital. Additionally, a scale measuring parental attitudes toward rational drug use was used. These instruments were administered to a total of 191 participants.

Results: The study included 191 parent-patient pairs, with an average age of 35±7.5 years for the parents and 6.1±5.6 years for the patients. Chronic illnesses were reported in 52.4% of patients, and 46.6% were on regular medication. A history of drug allergy was noted in 9.9% of patients with antibiotics identified as the most common trigger (68.4%). Parents showed high recognition of skin (89.5%) and gastrointestinal (56%) symptoms but were less aware of respiratory (39.3%) and cardiovascular (16.2%) symptoms. Parents with higher education levels demonstrated a greater awareness that skin symptoms could be accompanied by other system symptoms (respiratory and cardiovascular systems; p=0.004, p=0.001). The average score on the parental attitudes scale was 178.6±14.7, with correct and conscious use and effective and safe use subscale scores of 133±13.6 and 45±7.9, respectively. Higher parental education was associated with better awareness of rational drug use (OR=1.89; 95% CI=1.05-3.42; p=0.030).

Conclusion: Educating parents about drug allergy symptoms and involving them in the management of drug allergies is essential for improving pediatric care outcomes.

Keywords: Children, Drug allergy, Drug utilization, Health attitudes, Medication errors, Nonprescription drugs, Surveys and questionnaires

INTRODUCTION

Drug allergies are adverse drug reactions that occur through immunological mechanisms. Representing 5-10% of all adverse drug reactions, drug allergies are significant due to their unpredictable nature and potential to lead to life-threatening reactions (1-3). Parental report is crucial in distinguishing whether reactions in pediatric patients are drug-related. The enhancement of awareness among families with regard to drug allergies is likely to facilitate more accurate diagnostic approaches (4).

The World Health Organization (WHO) defined the concept of rational drug use in 1985 as "a set of rules requiring that patients receive medications appropriate to their clinical needs, in doses that meet their individual requirements, for an adequate period of time, and at the lowest cost to themselves and their community" (5). Rational use of medicines involves first establishing the diagnosis of the disease, selecting the appropriate medication for treatment, prescribing it to the family, providing detailed information regarding drug use, and monitoring outcomes. The provision of rational drug use in children depends on their parents' attitudes towards this issue.

This study aims to evaluate the awareness levels of parents of hospitalized patients regarding drug allergies and rational use of medicines.

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Received : 10.02.2025
Accepted : 07.04.2025
DOI: 10.12956/TJPD.2025.1110

MATERIALS and METHODS

The study was conducted at the Pediatric Allergy and Immunology Clinic of Ankara Bilkent City Hospital.

The study included 191 parent-patient pairs who were hospitalized in the pediatric wards of Ankara Bilkent City Hospital from October 1 to 31, 2024, and who volunteered to participate. Written consent was obtained from patients over nine years old and their parents, as well as from parents of patients under nine years old.

Demographic characteristics of the patients, length of hospitalization, chronic illnesses, and presence of regular medication usage were recorded. A history of drug allergies was queried, and the responsible drugs and clinical features of reactions were noted. Case scenarios were developed by researchers to assess parents' awareness levels regarding drug allergies and side effects. Additionally, a parental attitude toward rational drug use was applied to all participants. This scale, validated in Turkish by Sarıalioğlu et al. (6), consists of 40 items on a Likert-type scale. Each statement is rated on scale from 1 to 5, with positive questions scored as "strongly disagree", "disagree", "neutral", "agree" and "strongly agree" (1-5). The scale includes two sub-dimensions: correct and conscious use, and effective and safe use, with a maximum score of 145 for correct and conscious use, and 55 for effective and safe use, totaling a maximum of 200 points. Higher scores indicate a more positive attitude towards rational drug use among parents.

Statistical analysis was performed using IBM Statistical Package for the Social Sciences, version 25.0 (SPSS Inc., Armonk, NY, IBM Corp., USA). Categorical variables were expressed as percentages (%) and counts (n), while numerical variables were expressed as mean, standard deviation, minimum, and maximum values. Normality of continuous variables was tested using the Kolmogorov-Smirnov test. The t-test was used for analysis of normally distributed continuous variables between two groups, and the Mann-Whitney U test was used for comparing non-normally distributed continuous variables. Regression analysis was conducted to measure the relationship between two or more quantitative variables. Pearson's chi-square test and Fisher's Exact Test were used for the analysis of categorical variables, with $p<0.050$ accepted as the significance threshold.

RESULTS

A total of 191 parent-patient pairs were included in the study. The average age of the parents was 35±7.5 years, while the average age of the patients was 6.1±5.6 years. The average length of hospital stay for patients was 17±46 days (median, 5 days; range, 1-360 days). Chronic illness was present in 52.4% of patients ((Examples of prevalant chronic conditions observed

Table I: Demographic characteristics of participants and clinical features related to drug allergy history

Characteristics of parents	
Parent age (years)*	35±7.5
Number of children†	2 (1-3) (1-7)
Educational status‡	
Secondary education or lower	73 (38.2)
High school or higher	118 (61.7)
Residence‡	
Village	16 (8.4)
District	85 (44.5)
City	90 (47.1)
Patient age (years)*	6.1±5.6
Gender (male)†	97 (50.8)
Presence of chronic illness‡	100 (52.4)
Chronic illnesses	
Congenital metabolic diseases	11
Epilepsy	8
Chronic kidney disease	8
Asthma	7
Cerebral palsy	7
Hydronephrosis	6
Type 1 Diabetes Mellitus	4
Down syndrome	4
Hypothyroidism	3
Multiple Sclerosis	3
Ataxia	2
Common variable immune deficiency	2
Severe combined immunodeficiency	2
Increased intracranial pressure syndrome	2
Osteogenesis imperfecta	2
Autoimmune hepatitis	2
Bronchopulmonary dysplasia	2
Systemic lupus erythematosus	2
Other chronic diseases	23
Presence of concomitant atopic disease‡	12 (6.2)
Presence of regular treatment‡	89 (46.6)
Presence of history of multiple hospital admissions‡	134 (70.2)
Presence of history of drug-related side effects‡	12 (6.3)
Presence of history of drug-related allergic reactions‡	19 (9.9)
Antibiotics	13 (68.4)
NSAIDs	2 (10.5)
Other§	4 (21.1)
Organ systems affected by drug-related allergic reactions‡	
Skin	15 (78.9)
Respiratory	8 (42.1)
Gastrointestinal	2 (10.5)
Cardiovascular	5 (26.3)

**: mean (SD), †: median (IQR) (min-max), ‡: n(%), §: (Antiepileptics, antiemetics, chemotherapeutic agents)*

include congenital metabolic disorders [n=11], epilepsy [n=8], chronic kidney disease [n=8], asthma [n=7], and cerebral palsy [n=7]). Additionally, 46.6% of the patients (n:89) reported regular medication use, while 53.4% (n:102) did not require regular medication.

When queried about drug side effects and allergies, 12 (6.3%) parents reported that their children had experienced at least one side effect from previously used medications. These reports were based on the parental observations, rather than doctor-diagnosed drug-related reactions. The frequency of drug-related side effects was significantly higher in children recieving regular medication for chronic illness compared to those without regular treatment (p<0.001). A history of drug allergies was reported by 19 (9.9%) parents, with antibiotics being the most implicated drug group (n=13, %68.4). The most frequently affected systems in patients with reported drug allergies were the skin and respiratory system. Additionally, based on information provided by families, five patients were considered to have experienced drug-induced anaphylaxis. It was observed that the parents of these patients avoided the suspected drug. Socio-demographic data and clinical characteristics related to participants' drug allergy history are summarized in Table I.

Responses to questions designed to evaluate parents' awareness of drug allergies indicated that skin (89.5%) and gastrointestinal system (56%) symptoms were most often linked to drug allergies. In contrast, symptoms associated with the respiratory system (39.3%) and cardiovascular system (16.2%) showed lower association rates. A total of 12% (n=23) of participants reported that allergic reactions to medications could present symptoms in all four systems. Parents with a high school education or above showed higher awareness regarding the possibility of skin, respiratory, and cardiovascular symptoms, compared to parents with lower education levels (p<0.001, p=0.004 and p<0.001 respectively). Ten parents in the study reported having prior knowledge of drug adverse reactions. Since the number of participants who received education on adverse drug reactions was insufficient, no statistical comparison was performed.

Responses to the questions designed by researchers regarding drug allergies and side effects showed that 90.6% (n=173) of participants accurately defined side effects, while 79.6% (n=152) correctly identified drug allergies. Parents whose children received regular treatment for chronic illness were more likely to recognize drug side effects compared to parents of children who did not receive regular treatment (p<0.001). Data is summarized in Table II.

Among the parents surveyed about their use of nonprescription medications, 112 participants (58.6%) reported using at least one. The most commonly used nonprescription drug group was analgesics, accounting for 46.4% of cases. Additionally, 24.1% of participants reported that they frequently used vitamin supplements without a prescription.

Table II: Responses of parents to questions regarding drug allergy and drug side effects

Questions (True frequencies)	
Allergic reactions may occur in the future even for medications that were previously taken without issues	148 (77.5)
Drug allergies are independent of the dosage used	161 (84.3)
Drug allergies are unpredictable	163 (85.3)
Drug side effects are predictable	63 (33)
Herbal products can also cause allergies	162 (84.8)
What is the most common group of drugs that cause allergies in children in Türkiye?	
Antibiotics	154 (80.6)
NSAIDs	21 (11)
Vitamin syrups	8 (4.2)
Cough syrups	8 (4.2)

***:** *n(%)*

Data from the parental attitude scale regarding rational drug use revealed a total score average of 178.6±14.7. The sub-dimension score for correct and conscious use averaged 133±13.6, while the effective and safe use sub-dimension averaged 45±7.9. Analysis of factors influencing the total score on the rational drug use scale identified parental education level as a significant positive factor (OR = 1.89; 95% CI = 1.05-3.42; p=0.030). Notably, parents with only one child scored significantly higher in the correct and conscious use sub-dimension compared to those with multiple children (p = 0.005). No statistically significant difference was observed in the effective and safe use sub-dimension.

DISCUSSION

This study aimed to assess the awareness of parents of hospitalized children regarding drug allergies, drug side effects, and rational use of medications. Notably, 9.9% of parents reported that their child had previously experienced at least one drug-related allergic reaction. Literature indicates that the prevalence of reported drug allergy histories among families during childhood varies between 2.9% and 16.8%, with only 4% confirmed as true drug allergies. In the United States, approximately 32 million people report penicillin allergy; however, after appropriate allergic evaluation, more than 95% can tolerate the responsible drug. This highlights the importance of diagnostic evaluation in accurately identifying or rule out incorrect drug allergy labels (7,8).

In studies involving adults, the prevalence of drug allergies in hospitalized patients has been reported between 0.4% and 1.14% (9-12). A study conducted in our clinic examining drug allergies in hospitalized children reported a confirmed drug allergy prevalence of 1.1% (13). In our study, patients reporting a history of drug allergies were referred to the pediatric allergy clinic for diagnostic testing.

Clinical manifestations of drug allergies often present as isolated skin reactions but can also escalate into life-threatening reactions involving the respiratory and cardiovascular systems (14). Our findings indicated a high level of parental awareness regarding cutaneous symptoms; however, the recognition of respiratory and cardiovascular symptoms as potential signs of drug allergies was notably lower. Given that drug allergies often present with skin findings, it is encouraging that parents exhibit high awareness in this area. However, the low recognition of early-type drug reactions absent skin manifestations highlights a critical need for enhanced education for families.

In a 2016 study in the UK, 19.3% of 411 adult participants reported nonprescription medication use, primarily analgesics (15). In Türkiye, a study in 2016 found that 30% of 15.697 adults used nonprescription medications (16). Our study revealed a notably high nonprescription medication use rate of 58.6%. This may be attributed to the prevalence of children with chronic illnesses requiring frequent hospitalizations and regular medication. In Türkiye, analgesics, vitamin-containing products, and herbal supplements can be obtained without a prescription, leading parents of chronically ill children to seek additional benefits from these products. It is imperative to increase awareness regarding the potential adverse effects and allergic reactions associated with these medications.

Rational use of medicines has been a subject of global discourse for many years. According to WHO data, approximately 50% of all medications are inappropriately prescribed and sold, and around 50% of patients do not use their medications correctly (17,18). In the literature, a study evaluating medications prescribed for childhood pneumonia report that 99.4% of patients received at least one antibiotic, with 87.4% receiving multiple prescriptions (19). Additionally, studies from developing countries emphasize that medications are often prescribed at inappropriate doses for a patient's age and weight (20).

In a study from Türkiye utilizing the parental attitude scale for rational drug use, a total score of 143.8±16.5 was reported, with a significant increase in the correct and conscious use sub-dimension scores as parental education level rose (21). In contrast, our study found the average total score on the rational drug use scale to be 157.1±16.2, with the correct and conscious use sub-dimension averaging 120.6±11.5, and the effective and safe use sub-dimension averaging 36.5±7.6. According to the literature, the high scale scores observed in our study can be explained by the fact that the study was conducted in a tertiary hospital, where parents are more frequently informed about medication use by healthcare professionals. Additionally, more than half of the parents had a high school education or higher.

In conclusion, hospitalized patients are at increased risk of adverse drug reactions due to the concurrent use of multiple medications and the presence of coexisting conditions, such as infections. This risk is particularly pronounced in children with chronic illnesses who require frequent hospitalizations and regular medication. Educating parents about the symptoms of adverse drug reactions, along with facilitating detailed allergic evaluations for those with a history of drug allergies, is crucial. Involving parents as key partners in a systematic approach to rational drug use— which includes accurate diagnosis, selecting the right treatment, ensuring proper dosing and duration, and ongoing monitoring—will greatly improve outcomes in pediatric care.

Ethics Committee Approval

This study was conducted in accordance with the Helsinki Declaration Principles. Ethics approval was granted by Ankara Bilkent City Hospital Clinical Trials (decision number 2-24-529).

Contribution of the Authors

Kuzu Kuşaklı A: Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the conclusions, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study. ***Aytekin Güvenir F:*** Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study. ***Kalaycı F:*** Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in necessary literature review for the study. ***Selmanoğlu A:*** Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results. ***Şengül Emeksiz Z:*** Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Reviewing the article before submission scientifically besides spelling and grammar. ***Dibek Mısırlıoğlu E:*** Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Reviewing the article before submission scientifically besides spelling and grammar.

Source of funding

The authors declare the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

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