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ORIGINAL ARTICLE

Prescribing Pattern of Asthma Therapy among Children with Asthma at Qassim Region, Saudi Arabia

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ABSTRACT

Background: Asthma is a chronic inflammatory condition affecting millions of children across the globe and requires long-term pharmacotherapy. This study was carried out with the objective to assess the prescription pattern in asthmatic children in Qassim region, Saudi Arabia.

Methods: A cross-sectional hospital-based-retrospective study was performed, which included out-patients children aged less than 14 years attending Al-Habib Hospital (HMG), Qassim region, Saudi Arabia, between 2010-2019 after obtaining Ethical Approval from the research unit.

Results: The most visited physicians was the pediatricians, who counted 53.84% of the total visits. Pediatricians prescribed more oral medications in comparison to Pediatric ER physicians, while Pediatric ER physicians tended to prescribe more antibiotics than pediatricians. In regard to prescribed suppository medication, the most commonly prescribed drug was paracetamol. There was no association between the specialty and prescribing patterns. Regarding prescribed IV medication, no association was found between the specialty and prescribing patterns. The most commonly IV medication was ceftriaxone, followed by salbutamol. In regard to nebulizers, and inhalers no association was found between the specialty and prescribing patterns.

Conclusion: The study effectively established the relationship between the prevalence and incidence of asthma. In order to properly manage asthmatic patients, it is necessary to develop asthma treatment recommendations and assess physician adherence to treatment guidelines.

Keywords: Asthma, Qassim, ISAAC, Therapy, Survey, Children

INTRODUCTION

Asthma is a chronic inflammatory airway disease that affects millions of individuals across the globe. Asthma prevalence varies, ranging from 5-20 % in both children and adults [l]. The prevalence of asthma in children and adolescents has been studied in Saudi Arabia. According to Al-Ghamdi *et al*., asthma prevalence in the southern area of Saudi Arabia is 19.5 % at sea level and 6.9 % at higher altitudes [2]. In Riyadh, Al Ghobian *et al*. found a prevalence rate of 25.3 % for a lifetime wheeze, 18.5 % for a recent wheeze, and 19.6 % for physician-diagnosed asthma among males and females students aged 16-18 years [3]. Based on research performed over the last three decades, the general incidence of asthma in children varies between 8 to 25 %, according to the Saudi Initiative for Asthma (SINA) [4]. This increase, according to Saudi Initiative for Asthma panels, is multi-factorial; part of it may be ascribed to our community's fast modernization, or it could be due to environmental causes (mostly sandstorms) [5]. A nationwide Saudi household survey conducted in 2013 estimated the burden of chronic medical disorders, including asthma, among Saudis aged 15 and older, and a self-reported clinical diagnosis of asthma was found to be 4.05 %. The International Society for the Study of Allergy in Children (ISAAC) was formed in order to assist children and adolescents suffering from asthma and proper diagnosis.

As a chronic disease, it necessitates not only long-term pharmacotherapy but also active patient participation [6]. The Global Initiative for Asthma (GINA) guidelines recommend the use of anti-asthmatic medications such as short-acting beta 2 agonists (SABA), long-acting beta 2 agonists (LABA), corticosteroids, xanthenes derivatives, and leukotriene receptor antagonists (LTRA) alone or in combination [7].

From the last few decades, the prescribing patterns of non-steroid and steroids have shifted tremendously [8]. Recently, drugs with better therapeutic window and better patient compliance have been into practice which offers better therapeutic drug monitoring. This present study was carried out with the objective of investigating a prescription pattern of anti-asthmatic medications among pediatric patients in the pediatric outpatient of AlHabib hospital(HMG).

METHODOLOGY

Study Design: A cross-sectional hospital-based-retrospective study included out-patients children attending Al-Habib Hospital (HMG), Qassim region, Saudi Arabia, in the duration 2010-2019 after obtaining Ethical Approval from the research unit. Informations were obtained from respondents and were held in strict confidence; hence, the names and other personal details were not recorded.

Sampling: Complete enumeration sampling technique was used, including patients who attended the outpatient clinic that fulfilled the inclusion criteria in the study during the study period.

Inclusion Criteria: The inclusion criteria include firstly, out-patients aging from 0-14 years old and secondly, the person being prescribed asthma therapies for asthmatic patients.

Exclusion Criteria: Patients suffering from any chronic illness such as cancer, diabetes, etc., were excluded.

Data Collection: Researchers collected information from patients' prescriptions/records for investigations. The data included the details of socio-demographic variables of

patients, clinical details of patients, medical illness as well as prescriptions.

Statistical Analysis: Data were analyzed using SPSS v.24. Descriptive statistics of % ages and cross-tabulation and Pearson Chi-square test were used for data analysis. Statistical (p-value) of 0.05 and 95% confidence interval will be used for this study.

RESULTS

3319 asthma pediatric patients (J45) with a mean age of 9 years (± SD 3 years) and 25082 medications were prescribed. The most visited physician was the pediatricians, who counted 53.84% of the total visits, followed by the Pediatric ER physicians, who counted 44.39% while, ophthalmology, family medicine, employee clinic, and neonatal unit counts for the least with < 0.05% (**Table 1**).

Table 1: Distribution of asthmatic children attending different clinical facilities.

Clinical description	Count	%
Cardiology	43	0.17
Employee clinic	3	0.01
Ent clinic	22	0.09
Er clinic	11134	44.39
Family medicine	10	0.04
Neonatal intensive care unit	7	0.03
Ophthalmology	4	0.02
Pediatric	13504	53.84
Pulmonary	355	1.42
N=	25082	

Pediatricians prescribed more oral medications in comparison to Pediatric ER physicians (5762 vs. 4673). Pediatric ER physicians tended to prescribe more antibiotics than pediatricians (P 0.00). However, as a trend, both prescribed macrolides more than penicillin, followed by cephalosporin. No association was found between antihistamine and the prescribers (P 0.157). Among antihistamines, the second generation was prescribed more than first-generation (2450 vs. 213). Loratadine derivatives were mostly prescribed from the second generation and dimetindene from the first generation. Montelukast, ivy extracts, were almost prescribed with the same rate between them; respectively (480 vs. 530), and (166, 172). Paracetamol was prescribed more by the pediatrician in comparison to Pediatric ER physicians (750 vs. 587) (**Table 2**).

Table 2: Distribution based on oral medical prescribed.

Medication	Count	%
Prednisolone	1848	17.77
Desloratadine	1669	16.05
Paracetamol	1362	13.10
Azithromycin	1130	10.87
Montelukast	1027	9.88
Cetirizine HCL	870	8.37
Ivy Leaf Extract	344	3.31

In regard to prescribed suppository medication, the most commonly prescribed drug was paracetamol. There was no association between the specialty and prescribing patterns (P 0.157 and 0.217). Diclofenac sodium was the next drug prescribed among the pediatrics (**Table 3**). It is observed that physicians avoided the usage of herbal products due to unknown reasons.

Table 3: Common suppository medication prescribed to children

Generic name	Count	%
Diclofenac Sodium	17	8.67
Domperidone	5	2.55
Glycerin	6	3.06
Herbal	1	0.51
Paracetamol	166	84.69
Sodium Biphosphate, Sodium Phosphate	1	0.51
N=	196	

In regard to prescribed IV medication and nebulizers, no association was found between the specialty and prescribing patterns. The most commonly IV medication was ceftriaxone, followed by salbutamol, albuterol. Cefuroxime axetil was the least preferred. The most commonly prescribed nebulizer was salbutamol (53.41%), followed by ipratropium (25.5%) and then budesonide (21.02%). While the most commonly prescribed inhaler was salbutamol followed by fluticasone (Table 4).

Table 4: Nebulized medications and inhaler prescribed to children with bronchial asthma

Generic name (Nebulizer)	Count	%
Budesonide	1123	21.02
Fluticasone Propionate	2	0.04
Ipratropium Bromide	1362	25.50
Salbutamol, Albuterol	2853	53.41
Salbutamol, Ipratropium Bromide Anhydrous	2	0.04
N=	5342	
Generic name (Inhaler)		
BeclomethasoneDipropionate	35	0.88
Budesonide	28	0.70
Budesonide Formoterol	64	1.61
Fluticasone Propionate	969	24.35
Aerochamber (Spacer)	1078	27.09
Salbutamol	36	0.90
Salbutamol, Albuterol	1356	34.08
Salmeterol, Fluticasone Propionate	408	10.25
Tiotropium bromide	2	0.05
Xylometazoline HCL	3	0.08
N=	3979	

The comparative study of the prescribed drug by pediatricians and ER in terms of antihistaminics, antibiotics, and inhalers has shown that the drug use varies significantly (**Table 5**). The individual classes of drugs showed their importance in the treatment (**Table 6**).

Table 5: Comparison between pediatricians and Pediatric ER physicians with regards to prescribing antihistamines

	Levocetirizine	Cetirizine	Chlorpheniramine Maleate	Desloratadine	Dimetandine	Diphenhydramine	Fexofenadine	Loratadine
Pediatric ER physicians	1	398	5	731	51	44	2	166
Pediatricians	7	461	5	912	57	46	3	188

Table 6: Comparison between pediatricians and Pediatric ER physicians with regards to prescribing antibiotics and inhalers

Comparisons of prescribing patterns with regards to antibiotics					
	Amoxicillin, Clavulanic Acid	Clarithromycin	Azithromycin	Cephalosporins	
Pediatric ER physicians	90	66	539	111	
Pediatrician	114	106	579	180	
Comparison prescribing pattern with regards to inhalers.					
	Beclomethasone Dipropionate	Budesonide	Fluticasone Propionate	Salbutamol	Salmeterol, Fluticasone Propionate
Pediatric ER physicians	14	47	397	620	178
Pediatrician	21	44	551	758	221
All	35	91	948	1378	399

DISCUSSION

The results revealed that little study had been done on assessing patterns of practice and the costs associated with each. Furthermore, there is no clear agreement on the prevalence or incidence of asthma in children.

Six of the twelve studies used the ISAAC questionnaire to assess the prevalence rate of pediatric asthma. This questionnaire was developed as part of a 1990 initiative based on joint research conducted by two teams from New Zealand and Germany. The goal of this initiative was to determine the global trend in asthma prevalence and to provide a framework for future etiological assessments of variables associated with asthma development and management [9]. The most recent phase of ISAAC (2003) discovered that while global asthma prevalence was slightly lower than in phase I (1993), it was still rising in densely populated countries such as Africa, Latin America, and parts of Asia. As a result, asthma is a significant healthcare burden that requires attention [10, 11].

The incidence of asthma in Saudi Arabia varies throughout the nation, according to our findings. Saudi Arabia is the world's 13th biggest country by land area. The climate is hot and dry, with chilly evenings. Some areas are found inland, above sea level, while others are found along the Red Sea and Persian Gulf coastlines [12, 13]. Variations in altitude, temperature, and humidity have been found to have an inverse relationship with the incidence of asthma symptoms [14]. As a result, these variables may have led to differences in asthma prevalence across Saudi Arabian areas, as shown by prevalence rates of 4 % and 15.5 % in Jazan and Madinah, respectively [15].

According to our analysis, studies using the ISAAC found prevalence rates of 4-33.7 % among Saudi Arabian children with asthma identified by doctors. Male gender, eating habits, keeping pets at home, and exposure to environmental variables were all linked to a greater incidence of asthma in these studies.

According to the Saudi Initiative for Asthma, the incidence of asthma in adults is unknown, but it varies from 8-25 % among Saudi children based on research done over the last three decades [16]. Al-Farah *et al*. published these findings based on the oldest epidemiological research of pediatric asthma in Saudi Arabia. The investigations were performed over a 17-year span in different parts of the nation in 1986, 1995, and 2003, using a survey technique comparable to the ISAAC questionnaire. According to the findings of this research, there was a 1241 % rise in asthma prevalence between 1986 and 1995, followed by a 1201 % decrease between 1995 and 2003. It should be emphasized, however, that this research did not look at the prevalence of asthma in the same cities but rather looked at cities with comparable geographical features.

Questionnaires were employed in three additional investigations to determine the prevalence of asthma. The first research, performed in Al-Khobar in 2000, found a cumulative prevalence rate of 9.5 % for questionnaire-diagnosed asthma. The second study was performed in Taif [6] in 2015, and it discovered a 13.4 % overall prevalence rate for asthma, with asthma being more prevalent in younger children. The third research was performed in Abha [13], and the prevalence rate was found to be 9.5 %. However, direct comparisons of these studies are impossible due to a lack of data gathered by the surveying techniques used, as well as differences in age groups and climate between the two cities.

In addition, two studies performed in Japan [3] and Taif [6] found that asthma was more common in Saudi Arabia's rural regions than in urban areas. The differences in living circumstances, allergens, and socioeconomic levels between urban and rural regions were linked to these results. The differences in these results, however, were not statistically significant. Another research performed in Jeddah and adjacent villages yielded the opposite results (P-value 0.001), which is comparable to the findings of a previous international study by Al-Ghamd et al [17].

In a recent research, it was shown that asthma was more prevalent in male children (57.98%) than female children (41.02%) in Al-Mana General Hospital Khobar, Saudi Arabia. The most frequently prescribed drug for the

treatment of pediatric asthma was salbutamol (44.55%), followed by budesonide (30.97%) and montelukast (12.82%), with prednisolone (0.15 %) being the least recommended. The fixed-dose combination of budesonide and formoterol, which was recommended for the longest period of treatment (30 days) and imposed the greatest cost [197.10 SR (52.53 USD)] among all the prescribed medicines, was found to be the most expensive [18]. In comparison with our results, it was observed that the prescribing pattern matches paralleled, with salbutamol prescribed 53.41%, followed by budesonide (21.02%).

The obtained results in our study also matched in a similar pattern with a published Saudi hospital (Rabigh General Hospital) drug utilization pattern study in 2017, where patients ranged in age from four months to 79 years old, with 55.3 % of men and 44.7 % of women. Prescriptions for children accounted for 47.4 % of all prescriptions. The most often prescribed drugs were bronchodilators and steroids. Salbutamol and budesonide were the most often prescribed medications in each group. 89.5 % of the patients were taking two or more medications [19].

The National Guard Iskan Primary Care Center in Jeddah, Saudi Arabia, conducted a similar study on physician prescribing patterns and discovered that oral salbutamol was the most commonly prescribed medication in children, despite the fact that the prescribing for asthmatic children did not follow national guidelines for asthma treatment. In comparing the results, it complied similarly as the most frequently administered drug [20].

In an old study pertaining to the prescribing perspectives of physicians of King Khalid University Hospital, Dallah Hospital, Riyadh Medical Complex, and King Fahad National Guard Hospital against asthma in pediatrics, it was observed that the 6 agonists (inhaled 69%, oral 25 %), steroids (inhaled 33%, systemic 8%), cough mixtures (30%), antibiotics (26%), theophylline (21%), and miscellaneous (16%) were among the medicines given. Over half of the patients (55%) were using six agonists on a regular basis. Adding steroids (inhaled 56%, systemic 27%, or increasing the inhaled dosage 16%), beginning inhaled 6 agonists (28%), and stopping theophylline were the most common modifications undertaken (9%) [21]. From this study, it has been noted that an abrupt shift in prescribing xanthophylline derivatives (salbutamol, etc.) over the steroids and other medications has been into practice owing to multiple pharmacodynamic and pharmacokinetic advantages.

CONCLUSION

The study successfully investigated the prescription pattern of anti-asthmatic medications among pediatric patients and open new avenues for treatment. The current practice among physicians and the changing trend from the last decades opened several therapeutic advantages by overcoming the therapy-oriented challenges.

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