

LETTER TO THE EDITOR

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Direct Costs of Asthma in a Referral Public Children's Hospital in Tehran, Iran

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ABSTRACT

Asthma is one of the most common chronic diseases all over the world, which impacts socioeconomics of families and health care systems. We need to estimate the costs of asthma to set health policies and structural adjustments to control burden of asthma in societies. The aim of present study was to evaluate direct costs of asthma in children in Tehran-Iran.

In a descriptive-analytical study, 100 children who were referred to Children's Medical Center of Tehran University of Medical sciences, from March 2014 to March 2015, were selected randomly and studied. In an interview with parents we evaluated direct costs of asthma including physician fees, admission fees, medication costs, costs of transportation, and others.

In present study, 72 patients (72.0%) were male and 28 patients (28.0%) were female with mean age of 6.9 ± 0.3 years old. Annual mean of direct costs of outpatient care were calculated $5,179,000 \pm 620,000$ Rials (159.3 ± 19 \$), and with considering the admission costs, direct medical expenditure were calculated $6,069,600 \pm 140,000$ Rials (186.7 ± 4 \$) throughout the year. Non-medical annual costs of asthma in children were calculated $4,439,700 \pm 437,540$ Rials (136.6 ± 13 \$) during 2014-2015 in Tehran-Iran.

Based on findings of present study, total costs of asthma with the help of close physician follow ups and effective usage of medications has decreased in recent decades; furthermore, in our study, outpatient management costs which accounted for 85.5% of total direct costs of asthma in children, had the largest share of direct costs of asthma management.

Keywords: Asthma; Children; Costs; Iran

INTRODUCTION

Health policy-makers around the world have to estimate burden of diseases and their influences in

societies to make correct decisions about public health policies and their promotions. Economic burden of diseases have multiple socioeconomic effects on public health and on families.^{1,2}

Asthma is a chronic airway disease which sometimes acts as a debilitating disease and it is the most common chronic disease of childhood all over the world.³

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Prevalence of asthma in recent years is increasing. It is estimated that until 2025, about 100 million patients will be added to community of asthmatic patients all over the world.³ Due to increase in incidence and prevalence of asthma, direct and indirect costs of this disease are amplifying.^{4,5} Present study, was conducted with the aim of calculating the direct costs of pediatric asthma in Tehran-Iran.

In a descriptive-analytical study from March 2014 to March 2015, 100 outpatient children with previously diagnosed asthma, who were referred to Children's Medical Center of Tehran University of Medical Sciences, were selected randomly and studied.

With an interview with parents, direct costs of asthma in children, during the past year were calculated. Direct costs of disease which we considered in present study were; physician fees, admission fees, medication costs, costs of transportation, and costs of accommodation in a hotel. During our study exchange rate for USD was 32,500 Rials.

According to our analysis 72 patients (72.0%) were male and 28 patients (28.0%) were female. Mean age of patients was 6.9 ± 0.3 years old with the age range of 1 to 14 years old. In terms of monthly income, 45.0% of families had low income (less than 308\$), 44.0% had middle level income (308 to 615\$), and only 11.0% of families had high income (more than 615\$). Majority (95.0%) of patients had insurance coverage. According to parental comments, 66.0% of patients had mild symptoms, 25.0% had moderate symptoms, 7.0% had moderate to severe, and 2.0% had severe symptoms. The most common aggravating factors for patients were pollens and air pollution (23%) and food and cold weather (20%). Medication consumption and medical care rates and their costs are shown at (Table 1).

Frequency of physician visits were 44.6% to subspecialists, 40.8% to specialists and 14.5% to general practitioners. 21.0% of patients were referred to emergency department at least once and 7.0% of them were hospitalized during last year.

To estimate the rough cost of hospitalization for a patient, we selected 33% of patients randomly, who were admitted to CMC (children's medical center) during the year of study and used the mean of their expenditure for further analysis.

Annually, mean of direct costs of outpatient medical care for a patient was calculated $5,179,000 \pm 620,000$ Rials (159.3 ± 19 \$), and with adding admission costs, mean of direct medical costs for an

asthmatic patient was estimated $6,069,600 \pm 140,000$ Rials (186.7 ± 4.3 \$).

With emphasizing transportation fees as the main component, direct annual non-medical costs were calculated $4,439,700 \pm 437,540$ Rials (136.5 ± 13.5 \$).

Previous studies have demonstrated that controlling asthma symptoms with the help of effective usage of medications and appropriate follow-ups, made the outpatient management costs the largest contributing factor of total asthma management costs in children.⁶⁻⁸ Based on findings of present study, outpatient management costs which accounted for 85.5% of total direct costs of asthma in children had the largest share of direct costs of asthma management in children. Similar to a local study, medication costs accounted for 52.2% of total outpatient costs and made the major part of it, and physician's fees with 39.0%, were the next one.⁸ In our study, inhaled corticosteroids were 61.0% of medications used in one year and they were the most expensive medication. As for decreasing part of hospitalization in direct costs,⁷⁻⁹ we see the same trend in our patients. In this study outpatient costs are greater than inpatient costs. With increasing awareness about the patho-physiology of the disease among physicians and helpful guidelines in recent years, asthma has become more under control and consequently the annual hospitalization rates have decreased (21% ER-7% Ward) and with correct usage of treatment regimens, outpatient costs due to medication fees have become the larger component of direct costs of asthma. But if we consider the inpatient fees for one patient who has a history of hospitalization in the last year, with the mean cost of 7,300,000 Rials (224.5\$) in one episode of hospitalization, the inpatient costs will account for a larger sum than direct costs. These findings are in accordance with Turkish study, which states that hospitalization costs are accountable for a smaller share of total direct costs of asthma annually, but if there would be any hospitalization, the cost of it will be accountable for the largest share of total cost.³ In this study non-medical direct costs (4,500,000 rials-138\$) in comparison with medical direct costs (6,070,000 rials-187\$) have a lesser part in economic burden of disease. If we want to explain this pattern in our study, we can point that only 11% of patients were from families with high income, so the parents of patients in other economic classes were less fortunate to provide expensive facilities to convenience their children's daily life, in addition only 22% of parents

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Table 1. Medication consumption and medical care in treating pediatric asthma and resulting costs

Medication/ Medical care	Mean	Costs
Salbutamol	3.35±0.25 (1-12) canister per year	335,000±25,200 Rials(10\$)
Inhaled corticosteroids	5.60±0.40 (0-15) canister per year	1,648,660±142,300 Rials(55\$)
Combined corticosteroid and long-acting beta 2-agonist	0.90±0.25 (0-12) canister per year	349,000±123,300 Rials(11\$)
Steroid nasal sprays	0.90±0.20 Spray per year	253,900±62,200 Rials(8\$)
Leukotriene receptor antagonists	45.20±7.00 Tabs per year	52,300±10,500 Rials(2\$)
Antihistamine agents	10.90±5.00 Tabs per year	60,180±30,600 Rials(1.8\$)
Nebulizer	0.60±0.40 pieces per year	3,650±2,300 Rials(0.1\$)
Spacer	0.90±0.03 pieces per year	22,500±750 Rials(0.7\$)
Influenza Vaccine	0.35±0.05 Times per year	105,000±15,000 Rials(3\$)
Spirometry	0.48±0.08 Times per year	63,360±10,560 Rials(2\$)
Skin Prick Test	0.48±0.05 Times per year	168,960±17,600Rials(5.2\$)
Chest X-Ray	0.72±0.08 Times per year	93,773±10,420Rials(2.9\$)
Pediatric Allergy & Asthma or Pulmonary-subspecialist visits	4.66±0.23 (1-10) Times per year	1,071,800±52,900Rials(33\$)
Pediatrician visits	4.27±0.46 (0-20) Times per year	768,600±82,800 Rials(23.6\$)
General Physician visits	1.52±0.28 (0-10) Times per year	182,400±33,600 Rials(5.6\$)
Any physician for asthma	10.45±0.60 (1-26) Times per year	2,022,800±169,300 Rials(62.2\$)

had a higher education and consequently higher knowledge about their child's disease.

Considering the rising inflation rates in our country and their effects on medication costs, we recommend further studies to be conducted in shorter intervals and different cities, with private and public health sectors participating in them.

In conclusion, asthma is one of the highest costly diseases in children. Advances in the field of medicine changed the shares of various parts regarding the costs and resulted in outpatient management costs being the major part of asthma costs in children due to adequate control of symptoms with the effective usage of drugs. This study with estimating economic burden and costs of pediatric asthma in the country will contribute as a baseline information provider for further studies.

REFERENCES

- Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet* 2006; 367(9524):1747-57.
- Bradshaw D, Groenewald P, Laubscher R, Nannan N, et al. Initial burden of disease estimates for South Africa, 2000. *S Afr Med J* 2003; 93(9):682-8.
- Beyhun NE, Soyer OU, Kuyucu S, Sapan N, Altıntaş DU, Yüksel H, et al. A multi-center survey of childhood asthma in Turkey--I: the cost and its determinants. *Pediatr Allergy Immunol* 2009; 20(1):72-80.
- Moreira P, Moreira A, Padrão P, Delgado L. The role of economic and educational factors in asthma: evidence from the Portuguese healthsurvey. *Public Health* 2008; 122(4):434-9.
- Park YS, Kim JH, Jang HJ, Tae YH, Lim DH. The effect of Asian dust on asthma by socioeconomic status using national health insuranceclaims data in Korea. *Inhal Toxicol* 2016; 28(1):1-6
- Barnett SB, Nurmagambetov TA. Costs of asthma in the United States: 2002-2007. *J Allergy Clin Immunol* 2011; 127(1):145-52.
- Kamble S, Bharmal M. Incremental direct expenditure of treating asthma in the United States. *J Asthma* 2009; 46(1):73-80.
- Sharifi L, Dashti R, Pourpak Z, Fazlollahi MR, Movahedi M, Chavoshzadeh Z, et al. Economic Burden of Pediatric Asthma: Annual Cost of Disease in Iran. *Iran J Public Health* 2018; 47(2):256-63.
- Weiss KB, Sullivan SD. Understanding the costs of asthma: the next step *CMAJ* 1996; 154(6):841-3.