

Determine Efficacy of a Short Course of Montelukast in Children with Intermittent Asthma and Viral Infection

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Abstract

Introduction

Mild intermittent asthma is common in children and viral infections are responsible for the majority of exacerbations. As leukotrienes are potent inflammatory mediators, some studies have shown that Montelukast, a leukotriene receptor antagonist, may be effective on reduction of asthma symptom. To determine whether a short course of Montelukast in asthmatic children with common cold would modify the severity of an asthma episode.

Materials and Methods

Children, aged 6-12 years with intermittent asthma participated in this randomized, double-blind, placebo-controlled clinical trial. Treatment with Montelukast or placebo was initiated at the onset of viral upper respiratory tract infection and continued for 7 days. Primary outcomes included the clinical manifestation: duration of episodes, daily symptom, nights symptoms and activity limitation. Secondary outcomes included the need for beta agonist usage, oral prednisolone, physician visit, hospital admission and school absence.

Results

A total of 187 children with intermittent asthma were randomized, 93 to Montelukast group and 94 to placebo group. Montelukast significantly decreased the cough by 17.3% ($P<0.001$), nighttime awakenings by 5.4% ($P=0.01$), interference with normal activity by 6% ($P<0.01$), time off from school by 6% ($P<0.01$), β -agonist usage by 17.2% ($P<0.001$) and doctor visits by 12.2% ($P<0.01$) compared to placebo. Whereas there was a non significant reduction in wheezing, tachypnea, respiratory distress, asthma exacerbation, oral prednisolone and hospitalization ($P=0.8$).

Conclusion

A short course of Montelukast, introduced at the first sign of a viral infection, results in a reduction in cough, β -agonist use and nights awakened, time off from school and limitation of activity. More studies are needed to evaluate the optimal dose and duration of treatment.

Keywords

Intermittent Asthma, Montelukast, Viral infection.

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Introduction

Asthma is a major public health problem with a huge social and economic burden affecting 300 million people worldwide. Intermittent asthma, is the most common pattern of childhood asthma, accounting for up to 75% of children with asthma (1).

Viral respiratory infections are the major cause of acute asthma exacerbations in this patients (2-9). Acute exacerbations are also associated with decreased lung growth and add substantially to both the cost and morbidity associated with asthma (10-13). Leukotrienes are important inflammatory mediators in allergic and non allergic inflammation of the entire airways (14-16). Montelukast, a leukotriene receptor antagonist, has a rapid onset of action and may be effective on reduction of asthma exacerbation if use at early onset of viral upper respiratory tract infection (17-20). The objective of the study was to determine the efficacy of a short course of Montelukast in children with intermittent asthma and viral infection.

Materials and Methods

This was a randomized, double-blind, placebo-controlled clinical trial carried out between September 2011 and September 2013 in Allergy Research Center, Qaem university hospital, Mashhad, Iran. The study was approved by the Human Research Ethics Committees of each participating center, and a written, informed consent was obtained from the parent.

Eligibility criteria were as follows: Children with intermittent asthma aged between 6 to 12 years, asymptomatic between episodes, no asthma medication between episodes.

Exclusion criteria were: any underlying disease such as heart disease or cystic fibrosis, taking antihistamine or Montelukast, missing follow up visits and environmental exposures such as tobacco smoke.

The patients were visited at early manifestations of viral respiratory infection. Montelukast was given at the dose of 5 mg for 7 days. Patients could receive inhaled β -agonist and oral prednisolone according to a customized asthma management plan. Each patient followed for 2 months by phone call at the end of first month and physician visit at the end of 2nd month. A symptom diary was completed by parents.

Primary outcomes included the clinical manifestation: duration of episodes, daily symptom, night time symptoms and activity limitation. Secondary outcomes included the need for beta agonist usage, oral prednisolone, physician visit, hospital admission and school absence.

The principal analyses were intention-to-treat analyses, but sensitivity analyses and a per protocol analysis were also done on the primary endpoint. Between-group comparisons of categorical data were assessed using the chi-square test. Between-group comparisons for continuous data were made using the nonparametric Mann-Whitney test, and hence medians and interquartile ranges are reported.

Results

A total of 200 patients were recruited, 187 patients were randomized into two treatment groups (93 cases in Montelukast group and 94 cases in placebo group). The baseline characteristics of the patients are described in (Table 1).

Table 1: Baseline characteristics of patients

	Case Number(Percent)	Control Number(Percent)	P value
Male	47(50.5%)	47(50%)	0.86
Mean age(year)	7.2	7.5	0.7
FH of asthma	9(9.6%)	8(8.5%)	0.67
FH of allergic rhinitis	9(9.6%)	6(6.4%)	0.18
FH of eczema	11(11.8%)	9(9.5%)	0.5
FH of allergy	16(17.2%)	18(19.1%)	0.74

There were no significant differences between the two treatment groups for baseline characteristics.

There was significant difference in the incidence of day cough, night cough and activity limitation between the two groups but not for wheeze, breathlessness and tachypnea (Table 2).

Table 2: Comparing clinical manifestation of patients between two groups

	Case	Control	P value
Day cough	19(20.4%)	35(37.2%)	<0.001
Night cough	4(4.3%)	9(9.6%)	<0.01
Wheeze	2(2.1%)	3(3.1%)	0.8
Activity limitation	4(4.3%)	10(10.6%)	<0.01

There was also significant difference in the incidence of time off school and Pediatrician visits and β -agonists use between the two groups but not for oral prednisolone useage and hospital admission rate (Table 3).

Table 3: Comparing treatments and complications between two groups.

	Case	Control	P value
β -agonists use	19(20.4%)	36(38.3%)	<0.001
Oral prednisolone	2(2.1%)	3(3.1%)	0.8
Physician visit	17(18.3%)	29(30.8%)	<0.01
Hospital admission	2(2.1%)	3(3.1%)	0.8
School absence	4(4.3%)	10(10.6%)	<0.01

Discussion

This study demonstrated that in children with intermittent asthma, a short course of Montelukast at the onset of viral respiratory infection results in a significant reduction in day cough (16.8% reduction), night cough, activity disturbed and use of β -agonists and 12.5% fewer Pediatrician visits and emergency department attendances. Although there was no significant effect on wheezing, respiratory distress and tachypnea and oral prednisolone use, hospital admission. There was no adverse

effect of montelukast happened in our patients.

Epidemiologic studies have detected viral upper respiratory infections in about 85% of childhood asthma exacerbations (1-4). Cysteinyl leukotrienes that are released in virus-associated wheeze mediate abnormalities of lung function including mucus production, decreased mucociliary clearance, changes in vascular permeability, and smooth muscle contraction (14-16). Montelukast is an oral specific Cysteinyl leukotriene receptor antagonist with rapid onset of action, together with an excellent safety profile and bronchoprotective effects for 20 to 24 hours (17-26).

Beyond the use of β -agonists, the current approaches to management of mild intermittent asthma have resulted in little or no benefits in modifying the course of the illness. Bisgaard et al. was determined a 31% reduction in the rate of asthma exacerbations and reduction in the overall rate of corticosteroid use of 32% with long course of Montelukast as controller (23). Because children with intermittent asthma are asymptomatic for the majority of the time, the early use of intermittent therapy may provide a clinically and cost-effective alternative approach to management. Robertson et al. showed that in this patients, short course montelukast therapy results in 14% reduction in asthma symptoms, the number of nights with disturbed sleep reduced by 8.6% and child days absent from school were reduced by 37%. There was no significant difference in the median number of β -agonist used per episode or oral steroid use (22).

In summary, for children with intermittent asthma, a course of parent-initiated montelukast at the onset of a viral respiratory infection or common cold results in a significant reduction in asthma symptoms, pediatrician visits, β -agonist use, and the modest reduction in activity disturbed and absence from school.

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