

## Comparing the effectiveness of oral montelukast versus cetirizine in the management of allergic rhino-conjunctivitis and its effect on quality of life among children: A randomized, double-blind clinical trial

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### Abstract

**Background:** Allergic rhino-conjunctivitis (AR) is a common disorder in children, which causes significant morbidity and impact on learning and day-to-day activities.

**Objectives:** To compare effectiveness of montelukast versus cetirizine in AR and its effect on the quality of life (QoL) among children aged 6-12 years, attending Asthma Clinic, Faculty of Medicine, University of Ruhuna, Sri Lanka.

**Method:** This was a randomized, double-blind, parallel-group trial; 'Group A' was given montelukast with a cetirizine dummy; 'Group B' was given cetirizine with a montelukast dummy. Primary endpoint was to compare improvement of nasal, eye and night symptom scores. Secondary endpoint was to compare the QoL between the groups. Total symptoms were assessed at baseline, one month, two months and three months.

**Results:** There were 176 children (62.5% boys) with a mean age of  $8.82 \pm 1.79$  years. Fifteen children were lost to follow-up, 7 from the montelukast and 8 from the cetirizine group. There was a significant reduction in all symptoms ( $p < 0.05$ ) every month in both treatment groups. Whilst montelukast group had more improved day and night symptom scores than cetirizine group, statistically significant improvement was seen only in the 3rd month ( $t=4.10$   $p < 0.001$ ). Mean QoL score showed no significant difference between the two groups at onset (montelukast  $9.01 \pm 9.4$  and cetirizine  $15.9 \pm 10.4$ ;  $t=0.369$ ;  $p=0.712$ ). Both groups showed a statistically significant improvement in all domains of QoL by completion of treatment ( $p < 0.05$ ). Upon completion, the montelukast group showed a significantly better QoL than the cetirizine group.

**Conclusions:** Both cetirizine and montelukast showed remarkable improvement in the symptoms and better QoL in

children. Study outcomes in all clinical domains and QoL were more significantly improved in montelukast group than in cetirizine group when treatment was continued for 3 months.

(Key words: Allergic rhinitis, Cetirizine, Montelukast, Nasal symptom score, Quality of life).

### Introduction

The commonest chronic allergic disorder in children is allergic rhino-conjunctivitis (AR) which has a negative impact on one's quality of life (QoL) and imposes a substantial economic expense<sup>1,2</sup>. Non-pharmacologic approaches, like avoiding triggers, are essential in managing patients<sup>3</sup>. Unfortunately, avoiding triggers is challenging in children<sup>4</sup>. Appropriate medication selection should yield the least side effects and help patients live normally<sup>5</sup>. Intra-nasal corticosteroids, antihistamines and leukotriene receptor antagonists are the most prevalent pharmaceutical treatments<sup>6</sup>. These drugs are found to be effective in treating both seasonal and perennial allergic rhinitis<sup>7</sup>. Cetirizine effectively relieves allergic rhinitis symptoms and is reported to improve the QoL of patients<sup>8</sup>. On the other hand, montelukast is a cysteinyl leukotriene receptor antagonist found to be effective, well-tolerated and safe in children<sup>8</sup>. It reduces the influx or activation of inflammatory cells that secrete cysteinyl leukotrienes in the upper airways<sup>8</sup>. There have been a few studies comparing the long-term effect of the two drugs in the treatment of AR in children<sup>9</sup>.

### Objectives

To compare the effectiveness of montelukast versus cetirizine in AR and its effect on the QoL in children aged 6-12 years, attending Asthma Clinic, Faculty of Medicine, University of Ruhuna, Sri Lanka


### Method

A randomized, double-blind, parallel-group trial was designed to compare the effectiveness of montelukast versus cetirizine in controlling symptoms of AR in children aged 6-12 years. Children who attended the Paediatric Asthma Clinic, Faculty of Medicine, University of Ruhuna from December 2020 to July 2021 were recruited based on the inclusion and exclusion criteria

**Inclusion criteria:** (1) Age between 6-12 years, (2) Having 3 out of 4 symptoms (sneezing, non-purulent rhinorrhea, itchy nose, nasal congestion) for more than 6 months (3) moderate-severe symptoms of AR; the presence of at least one troublesome symptom; sleep disturbance, impairment of daily activities, leisure, sport or studies.

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**Exclusion criteria:** (1) those who had taken treatment for AR (either oral treatment over last 2 weeks or intranasal treatment over last 4 weeks), (2) deformities of the nasal passages (3) children with AR without troublesome symptoms.

**Sample size:** A sample size of 176 was calculated according to the following study (Hsieh, 2004), where an estimated effect size of 0.9 (Standardized effect size =  $0.9/2 = 0.45$ ) with a two-sided test using G power 3.1.3., alpha 0.05 and a power of 0.80.

**Randomization:** Before implementing study, investigator prepared a random table (computer-generated) for selection of children for both cetirizine and montelukast treatment groups. Principal investigator selected eligible children at the paediatric asthma clinic and entered them in a separate register in the order they were recruited, the study numbers starting from 1. The research assistant looked at the predetermined random number table and decided which particular study number falls under which treatment group.

**Interventions:** Principal investigator reviewed patients two weeks after starting treatment to ensure that no adverse effects had developed. They were followed up every 2 weeks for 3 months. Patients were assessed for treatment response, treatment adherence and completing diary. Data were collected every 4 weeks regarding AR symptoms. QoL was assessed at first visit and again at the end of the study. Absence of improvement of symptoms at 1 month or worsening of symptoms at any visit was considered as treatment failure, and the particular child was removed from study. They were seen by the principal investigator and moved to a different regime of treatment, and followed up at the asthma clinic until recovery. Those unable to continue drugs due to poor compliance or had taken treatment similar to antihistamines for the same or any other illness or who developed major side effects or minor side effects that disturbed the lifestyle were considered as drop-outs of study.

**Allocation:** 'Group A' was given montelukast with a dummy tablet of cetirizine, and 'Group B' was given cetirizine with a dummy tablet of montelukast. Dummy tablets were prepared for both medications, Montelukast (Montiget) and Cetirizine (Alerid) are similar in colour and morphology.

**Outcomes measures:** Basic demographic information such as age, gender, weight, height, ethnicity, etc.) and parent's beliefs of external factors that affect the disease, school attendance and participation in sports were measured initially. AR was measured by the day and night symptoms score and the QoL was measured by the Paediatric Rhino-conjunctivitis Quality of Life Questionnaire (PRQLQ)

**Day and night symptom score:** Data were collected under two main categories, daytime symptoms and night-time symptoms. Day symptoms were assessed each night before bed (just before study drug administration) and night symptoms were assessed each morning on awakening. There were 6 daytime symptoms and 2 nighttime symptoms that were being rated during the study period. Daytime nasal symptoms (rhinorrhea, nasal congestion, sneezing, and nasal

pruritus) and daytime eye symptoms (tearing and itching) were each rated on a 4-point scale as follows: 0-none, 1-mild, symptoms noticeable, but easily tolerated, 2-moderate, symptoms bothersome but tolerable, 3-severe, symptoms difficult to tolerate and interfered with activities. Two night-time symptoms were also scored on a 4-point scale. It included difficulty in sleeping 0-not at all, 1-little, 2-moderate, 3-severe. Night-time awakening: 0- not at all, 1-once, 2-more than once, 3-awake all night. All these 8 symptoms were included in the symptom diary, which gave a total symptom score that ranged from 0-18 for nasal symptoms and 0-6 for eye symptoms. The parents were educated by the principal investigator or research assistant on how to mark the symptom diary. At first visit, symptoms of preceding week were marked on symptom diary together with the parents by a recall method. A 7 days symptom score was obtained prior to commencement of treatment as a baseline value.

**PRQLQ:** Parents were interviewed to assess the QoL of their children on 2 occasions - before commencing treatment (first clinic visit) and on completion of treatment. This questionnaire assessed 23 questions based on seven QOL domains; activity, sleep, nasal symptoms, eye symptoms, non-nose and non-eye symptoms, practical problems, and emotions. Parents gave their responses to each question on a 7-point scale ranging from 0 (not troublesome) to 6 (extremely troublesome). Questionnaire was validated for paediatric population to measure QoL. It was translated to Sinhala and Tamil languages and back-translated to the original language English, to check the accuracy of the translation, and questionnaire was pretested before using it in study (Cronbach alpha-0.76).

**Blinding:** The principal investigator and parents were blinded. The sealed packets which contained drugs and dummy adequate for 1 month were given to the parents by research assistant.

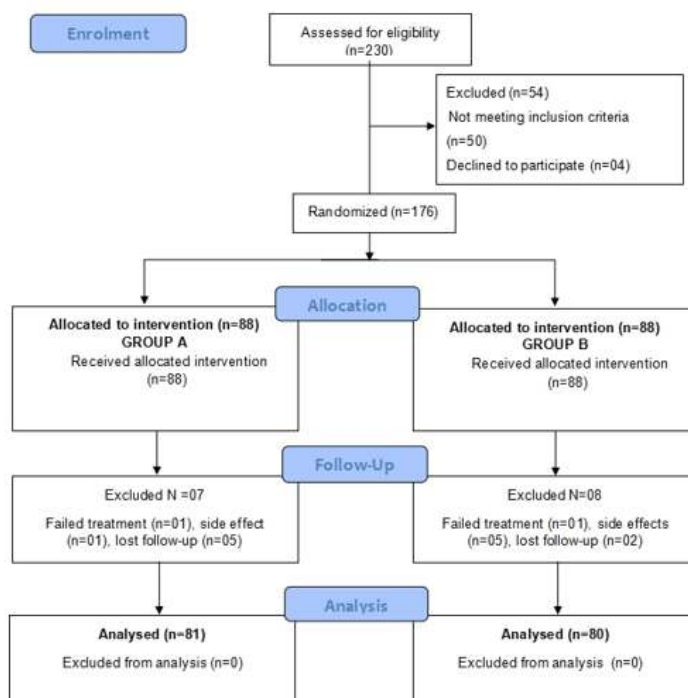
**Ethical issues:** Study approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Ruhuna (No.2020/P/108) on 22.10.2020. The trial was registered in the Clinical Trial Registry, Sri Lanka Medical Association- No. SLCTR/2020/027. Written informed consent was taken from the parents and participants were free to withdraw from the study at any time.

**Statistical analysis:** This was done on SPSS version 25.0; paired-sample t-test was used for pre- and post-test comparison. Primary endpoint was nasal symptoms score and secondary endpoint was QoL of children. Nasal symptom score of the two groups were compared at baseline, one month, two months and 3 months using independent sample t-test. Paired sample t-test analysed symptom reduction of each group from time of onset to primary, secondary and final endpoint. QoL at onset and at end in two groups were compared by independent sample t-test and the change in QoL was compared at onset and at end with the paired sample t-test.

## Results

Study protocol is shown in Figure 1. The 176 children were randomly allocated to Group A (montelukast, n=88) and

group B (cetirizine, n=88). There were fifteen drop outs, 7 from the montelukast group and 8 from the cetirizine group.



**Figure 1: Study Protocol**

Mean age of enrolled children was  $8.82 \pm 1.79$  years and 62.5% were boys. Mother's and father's mean ages were  $38.97 \pm 6.03$  years and  $42.03 \pm 6.63$  years respectively; 58.5% had one sibling. A family history of allergic rhinitis, asthma and eczema was present in 83.4%, 36.4% and 1.7% respectively.

Regarding parent's beliefs, 63.1% parents thought that symptoms worsened with food items such as ice cream,

yoghurt, curd, banana etc. and 59.1% believed worsening of symptoms with a bath/body wash. Absenteeism from school due to illness was reported by 29% of children and 19.9% avoided sports.

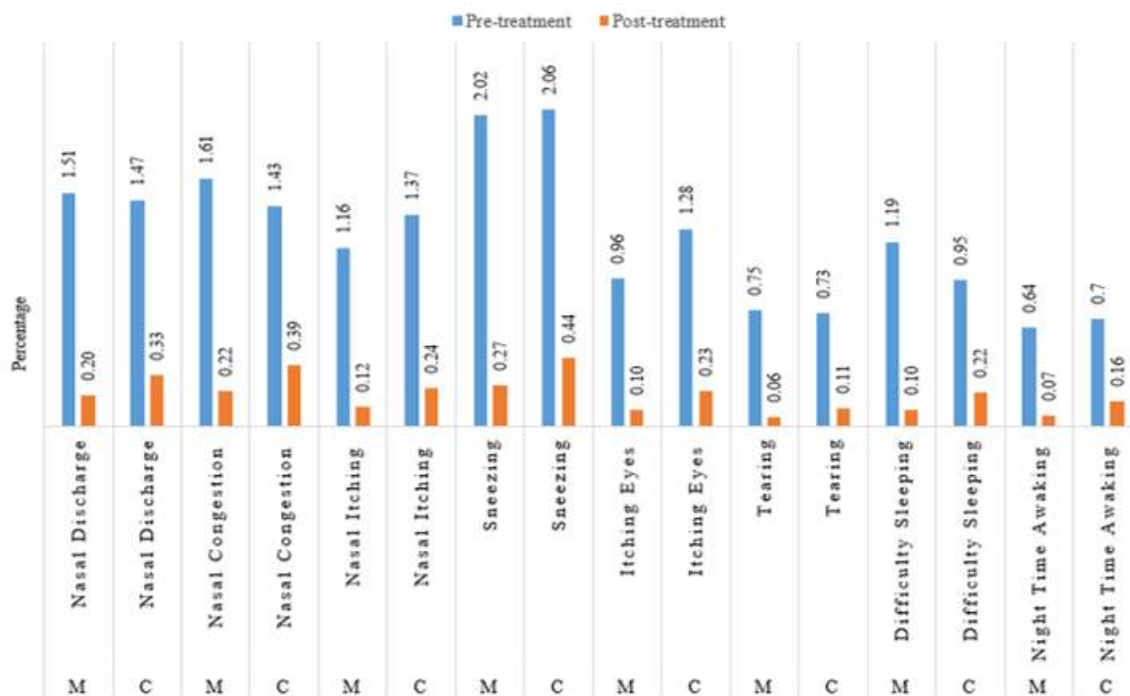
Table 1 shows the baseline characteristics of the study population. Both groups had similar baseline parameters ( $p > 0.05$ ).

**Table 1: Baseline characteristics of the study population**

Variable	Category	Total (n=176) n (%)	Montelukast (n=81) n (%)	Cetirizine (n=80) n (%)	p-value
Sex	Male	110 (62.5)	48 (59.3)	52 (65.0)	0.564
	Female	66 (37.5)	33 (40.7)	28 (35.0)	
Type of residence	Rural	97 (55.1)	40 (49.4)	48 (60.0)	1.862
	Urban	79 (44.9)	41 (50.6)	32 (40.0)	
Age at the onset of the disease	1-3 years	40 (22.7)	15 (18.5)	22 (27.5)	6.619
	4-6 years	89 (50.6)	41 (50.6)	39 (48.8)	
	7-12 years	47 (26.7)	25 (30.9)	19 (23.8)	
Time of day allergic symptoms are worse	Morning only	47 (26.7)	25 (30.9)	18 (22.5)	1.670
	Night only	22 (12.5)	09 (11.1)	12 (15.0)	
	Morning & night	93 (52.8)	40 (49.4)	43 (53.8)	
	Whole day	14 (8.0)	07 (8.6)	07 (8.8)	
Frequency of the symptoms	Almost daily	83 (47.2)	38 (46.9)	39 (48.8)	8.437
	$\geq 4$ days/week	61 (34.7)	34 (42.0)	20 (25.0)	
	<4 days/week	32 (18.2)	09 (11.1)	21 (26.3)	

Figure 2 shows the pre- and post-treatment day and night symptom scores. There was a significant improvement in

both day and night symptoms in both treatment groups from baseline to 3<sup>rd</sup> month as shown in Figure 2 ( $p < 0.05$ ).



**Figure 2: Pre- and post-treatment day and night symptom scores**

M: montelukast group, C: cetirizine group

Table 2 shows the mean symptom scores of both treatment groups from baseline to end of first, second and third months. Paired-sample t-test results showed that there is a significant reduction in symptoms every month compared to

previous month in every symptom category. This pattern of significance is observed in all symptom categories except night symptoms at the third month of the cetirizine group where improvement is not significant.

**Table 2: Improvement of day and night symptoms in both treatment groups**

Group	Symptom category	Baseline	Month 1	Month 2	Month 3
<b>Montelukast (n=81)</b>	Day	8.03±2.56	3.47±2.03*	1.90±1.42**	0.97±0.91***
	Night	1.37±0.15	0.71±0.07*	0.43±0.04**	0.32±0.03***
<b>Cetirizine (n=80)</b>	Day	8.37±2.38	3.30±2.10*	2.17±1.65**	1.74±1.39***
	Night	1.65±1.35	0.62±0.74*	0.40±0.54**	0.37±0.54

Note: Significance is tested with paired samples t-test.  $p < 0.05^*$ ,  $p < 0.01^{**}$ ,  $p < 0.001^{***}$

Group-wise comparison was done using independent sample t-test and it showed that the montelukast treated group had more improved symptoms than the cetirizine group (Table 3). However, statistically significant improvement was seen only at the 3<sup>rd</sup> month in all clinical parameters concerned.

Table 4 is a comparison of pre- and post-treatment QoL of children in both study groups. There was no significant difference in the QoL parameter on baseline visit between the two study groups (montelukast group  $9.01 \pm 9.4$  and

cetirizine group  $15.9 \pm 10.4$ ;  $t=0.369$ ;  $p=0.712$ ). There was a significant improvement in all QoL domains by the 3<sup>rd</sup> visit in both treatment groups ( $p < 0.01$ ).

Table 5 shows the change in mean QoL after treatment with montelukast and cetirizine. Comparing the two groups at completion, montelukast group showed a significantly better QoL than cetirizine group in all concerned domains. Comparing the two treatment groups, improvement of QoL in the montelukast group was statistically significant.

**Table 3: Mean improvement measured by daytime nasal, eye symptoms, and night symptom scores between the two treatment groups**

Variable			Visit	Montelukast (n=81)	Cetirizine (n=80)	t-value	Effect size
				Mean symptom score			d
Daytime symptoms	Nasal symptoms	Discharge	Baseline	1.51±0.76	1.47±0.79	0.355	0.0516
			Month 1	0.67±0.44	0.64±0.48	0.447	0.0651
			Month 2	0.41±0.33	0.40±0.31	0.190	0.0310
			Month 3	0.20±0.23	0.33±0.29	-3.140*	-0.4967
		Congestion	Baseline	1.61±0.73	1.43±0.76	1.526	0.2415
			Month 1	0.76±0.52	0.64±0.43	1.628	0.2515
			Month 2	0.40±0.33	0.40±0.31	-0.815	-0.1124
			Month 3	0.22±0.22	0.33±0.29	-3.595*	-0.5698
		Itching	Baseline	1.16±0.85	1.37±0.91	-1.519	-0.2385
			Month 1	0.51±0.56	0.53±0.50	-0.274	-0.376
			Month 2	0.26±0.33	0.32±0.40	-0.947	-0.1636
			Month 3	0.11±0.20	0.24±0.34	-2.745*	-0.4661
		Sneezing	Baseline	2.02±0.74	2.06±0.69	-0.333	-0.0559
			Month 1	0.86±0.48	0.78±0.41	1.256	0.1792
			Month 2	0.48±0.38	0.53±0.37	-0.885	-0.1333
			Month 3	0.26±0.22	0.43±0.32	-3.927*	-0.6193
	Eye symptoms	Itching	Baseline	0.96±0.87	1.28±0.92	-2.272	-0.3574
			Month 1	0.39±0.45	0.41±0.42	-0.309	-0.0459
			Month 2	0.21±0.30	0.29±0.36	-1.532	-0.2414
			Month 3	0.10±0.18	0.22±0.29	-3.188*	-0.4973
Tearing	Baseline	0.75±0.78	0.73±0.75	1.887	0.0261		
	Month 1	0.25±0.33	0.28±0.44	0.696	-0.0771		
	Month 2	0.11±0.19	0.15±0.30	-1.228	-0.1593		
	Month 3	0.05±0.13	0.11±0.20	-2.683*	-0.3558		
Nighttime symptoms	Difficulty sleeping	Baseline	1.19±0.81	0.95±0.80	1.887	0.2981	
		Month 1	0.41±0.44	0.36±0.43	0.696	0.1149	
		Month 2	0.19±0.25	0.25±0.36	-1.228	-0.1936	
		Month 3	0.10±0.17	0.21±0.33	-2.683*	-0.4192	
	Night awake	Baseline	0.64±0.79	0.70±0.81	-0.456	-0.075	
		Month 1	0.24±0.38	0.26±0.40	-0.334	-0.0512	
		Month 2	0.11±0.21	0.15±0.24	-1.006	-0.1774	
		Month 3	0.06±0.17	0.16±0.25	-2.647*	-0.4677	

Note: Significance is tested with independent samples t-test; \* $p < 0.05$  was considered statistically significant

**Table 4: Comparison of pre- and post-treatment quality of life of children in both study groups**

Group	Quality of life domains	Baseline Mean ± SD	Month 3 (after treatment) Mean ± SD	t-value	Effect size
Montelukast (n=81)	Sleep	3.89±3.12	0.65±1.11	11.193*	0.5295
	Nasal symptoms	15.20±5.03	3.34±3.29	27.108*	2.790
	Eye symptoms	6.55±5.18	1.39±2.32	10.474*	1.2856
	Non-nose symptoms	4.79±3.65	1.16±1.70	10.054*	1.2749
	Emotions	6.38±4.60	1.47±2.20	10.875*	1.3618
	Activity	0.42±1.25	0.07±0.35	2.802*	0.3813
Cetirizine (n=80)	Sleep	3.65±3.34	1.17±1.89	7.898*	0.9139
	Nasal symptoms	15.16±5.21	6.30±4.32	15.195*	1.8513
	Eye symptoms	7.38±4.87	2.29±2.41	11.640*	1.3247
	Non-nose symptoms	4.87±4.23	1.97±2.13	7.228*	0.8659
	Emotions	6.46±4.28	2.38±2.51	9.503*	1.1629
	Activity	0.24±0.92	0.03±0.25	2.326*	0.3115

Note: Significance is tested with paired samples t-test.  $t^*p < 0.05$  was considered statistically significant

**Table 5: Change in mean QoL after treatment with montelukast and cetirizine**

Table 3: Change in mean GDL after treatment with montelukast and cetirizine							
Variable	Group	Number	Mean	SD	SE	t-value	p-value
Quality of life	Montelukast	81	9.0128	9.47107	1.07239	4.284***	<0.001
	Cetirizine	80	15.935	10.67749	1.20899		
Effect size = -0.6858							

Significance is tested with paired samples t-test.  $p < 0.05^*$ ,  $p < 0.01^{**}$ ,  $p < 0.001^{***}$

No adverse drug reactions were observed in the montelukast group, while mild non-serious adverse effects were observed in the cetirizine group, including sleepiness (n=5) and dry mouth (n=1).

## Discussion

Present study compared effectiveness of oral montelukast and cetirizine in management of AR and its effect on QoL among children. Results revealed that montelukast and cetirizine are both effective and well-tolerated. However, montelukast was more efficacious in improving total symptom score for day and night symptoms as well as QoL indicators, including sleep, nasal symptoms, eye symptoms, non-nose symptoms, emotions and activity. A recent meta-analysis concluded that montelukast was more effective than placebo in management of AR<sup>10</sup>. However, its efficacy as a mono-therapy wasn't potent in treating AR compared to the combined treatment with both oral antihistamine and intranasal fluticasone. It was reported that intranasal fluticasone spray is more effective than montelukast in improving both daytime and night-time nasal symptom scores<sup>9,10</sup>.

During the past few years, several double-blind and placebo-controlled trials have been conducted to evaluate effectiveness of montelukast mono-therapy, combination therapy with second-generation antihistamine and with or without intranasal corticosteroids for management of AR. Montelukast, compared to antihistamines, responded better in controlling day and night nasal symptoms<sup>11,12</sup>. However, the data presented in studies assessing the effectiveness of montelukast in combination with cetirizine are still ambiguous. While studying montelukast and cetirizine combination therapy, Kurowski M, *et al*<sup>13</sup> found improved scores compared to treatment with the two drugs alone. In contrast, Nayak AS, *et al*<sup>7</sup> found no statistically significant outcomes, but an improvement trend was observed compared to mono-therapy. Our study results indicate a statistically significant reduction in mean day and night time symptoms in both treatment groups from baseline to 3<sup>rd</sup> month. Comparing the two treatment groups, montelukast group displayed a significant improvement over cetirizine by the third month.

We also observed a significant improvement in all domains of QoL by the 3<sup>rd</sup> visit in both treatment groups, while comparison between groups showed significantly improved QoL of patients treated with montelukast compared to cetirizine. Consistent with our findings, Meltzer EO, *et al*<sup>11</sup> showed significant improvement in QOL with concomitant administration of montelukast and antihistamines in comparison with placebo or monotherapies. Hsieh JC, *et al*<sup>14</sup> reported significantly improved QoL of the AR children treated with either montelukast or cetirizine compared to placebo, with no significant difference between the two treatment drugs<sup>14</sup>.

Our study results indicate that montelukast is relatively safe for paediatric patients. There are some concerns when we select an appropriate drug including safety and efficacy for specific age group, type of AR, dosage form availability, and cost<sup>15</sup>. Neuropsychiatric behaviour, described as a side effect

of montelukast was not seen in our study group. However, sleepiness was observed by Chen ST, *et al*<sup>16</sup>, which might be the main reason for poor compliance in the cetirizine group.

The study was limited to a single centre with small sample size. In the future, large-scale, long-term multi-centre studies are recommended to allow generalizability.

## Conclusions

Both cetirizine and montelukast are beneficial for the treatment of overall AR symptoms along with significant improvement in QoL. Montelukast is more effective than cetirizine in controlling symptoms and improving QoL with no adverse drug reactions.

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## References

1. Meng Y, Wang C, Zhang L. Recent developments and highlights in allergic rhinitis. *Allergy* 2019; **74**: 2320–8.  
<https://doi.org/10.1111/all.14067>  
PMid: 31571226
2. Schuler CF, Montejo JM. Allergic rhinitis in children and adolescents. *Pediatric Clinics of North America* 2019; **66**: 981–93.  
<https://doi.org/10.1016/j.pcl.2019.06.004>  
PMid: 31466686
3. Bjermer L, Westman M, Holmström M, Wickman MC. The complex pathophysiology of allergic rhinitis: *Allergy, Asthma and Clinical Immunology* 2019; **15**(1): 1-5.  
<https://doi.org/10.1186/s13223-018-0314-1>  
PMid: 31015846 PMCid: PMC6469109
4. Iqbal M, Khan SF, Khan S, Ahmad W. Fungal infection exacerbate nasal polyposis. *International Journal of Endorsing Health Science Research* 2021; **9**(2): 170-5.  
<https://doi.org/10.29052/IJEHSR.v9.i2.2021.170-175>
5. Brown T. Diagnosis and management of allergic rhinitis in children. *Pediatric Annals* 2019; **48**: e485–8.  
<https://doi.org/10.3928/1938235920191111-01>
6. Hossenbaccus L, Linton S, Garvey S, Ellis AK. Towards definitive management of allergic rhinitis: *Allergy, Asthma and Clinical Immunology* 2020; **16**: 39.  
<https://doi.org/10.1186/s13223-020-00436-y>  
PMid: 32508939 PMCid: PMC7251701
7. Nayak AS, Philip G, Lu S, Malice MP, Reiss TF. Efficacy and tolerability of montelukast alone or

- in combination with loratadine in seasonal allergic rhinitis. *Annals of Allergy, Asthma and Immunology* 2002; **88**: 592–600.  
[https://doi.org/10.1016/S10811206\(10\)61891-1](https://doi.org/10.1016/S10811206(10)61891-1)  
 PMid: 12086367
8. Phan H, Moeller ML, Nahata MC. Treatment of allergic rhinitis in infants and children: efficacy and safety of second-generation antihistamines and montelukast. *Drugs* 2009; **69**(18): 2541-76.  
<https://doi.org/10.2165/988496000000000000-00000>  
 PMid: 19943707
  9. Lagos JA, Marshall GD. Montelukast in the management of allergic rhinitis. *Therapeutics and Clinical Risk Management* 2007; **3**(2): 327.  
<https://doi.org/10.2147/tcrm.2007.3.2.327>  
 PMid: 18360641 PMCID: PMC1936314
  10. Krishnamoorthy M, Mohd Noor N, Mat Lazim N, Abdullah B. Efficacy of montelukast in allergic rhinitis treatment. *Drugs* 2020; **80**: 1831–51.  
<https://doi.org/10.1007/s40265-020-01406-9>  
 PMid: 32915441
  11. Meltzer EO, Malmstrom K, Lu S, Prenner BM, Wei LX, Weinstein SF, *et al.* Concomitant montelukast and loratadine as treatment for seasonal allergic rhinitis: a randomized, placebo-controlled clinical trial. *Journal of Allergy and Clinical Immunology* 2000; **105**(5): 917-22.  
<https://doi.org/10.1067/mai.2000.106040>  
 PMid: 10808172
  12. Philip G, Williams-Herman D, Patel P, Weinstein SF, Alon A, Gilles L, *et al.* Efficacy of montelukast for treating perennial allergic rhinitis. *Allergy and Asthma Proceedings* 2007; **28**: 296–304.  
<https://doi.org/10.2500/aap.2007.28.3000>  
 PMid: 17619558
  13. Kurowski M, Kuna P, Gorski P. Montelukast plus cetirizine in the prophylactic treatment of seasonal allergic rhinitis. *Allergy* 2004; **59**(3): 280-8.  
<https://doi.org/10.1046/j.13989995.2003.00416.x>  
 PMid: 14982509
  14. Hsieh JC, Lue KH, Lai DS, Sun HL, Lin YH. A comparison of cetirizine and montelukast for treating childhood perennial allergic rhinitis. *Pediatric Asthma, Allergy and Immunology* 2004; **17**(1): 59-69.  
<https://doi.org/10.1089/088318704322994958>
  15. Wise SK, Lin SY, Toskala E, Orlandi RR, Akdis CA, Alt JA, *et al.* International consensus statement on allergy and rhinology: Allergic rhinitis. *International Forum of Allergy and Rhinology* 2018; **8**(2): 108–352.  
<https://doi.org/10.1002/alr.22073>
  16. Chen ST, Lu KH, Sun HL, Chang WT, Lue KH, Chou MC. Randomized placebo-controlled trial comparing montelukast and cetirizine for treating perennial allergic rhinitis in children aged 2–6 yr. *Pediatric allergy and Immunology* 2006; **17**(1): 49-54.  
<https://doi.org/10.1111/j.13993038.2005.00351.x>  
 PMid: 16426255