

Usage of a Novel Inhaler Device for the Management of Asthma in Children with Special Needs

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Abstract

Dear Editor, I am writing to submit a letter titled "Usage of a Novel Inhaler Device for the Management of Asthma in Children with Special Needs" for your consideration. This letter highlights the importance of the inhaler device technique in children with asthma when they have comorbid conditions such as attention-deficit/hyperactivity disorder (ADHD) and/or autism spectrum disorder (ASD). These comorbidities often make it challenging for physicians to plan a treatment regimen, as it impacts the patient's adherence to medication. We evaluated the effectiveness of a breath-actuated inhaler (BAI) in managing poorly controlled asthma in three pediatric patients with special needs. All patients showed significant improvement in their asthma symptoms, were well-controlled after one month of using the BAI and they found that device was easy to use. This letter contributes to the growing body of evidence supporting the effectiveness of BAI in the management of asthma, particularly in children with special needs. We hope this work to be submitted under the letter to editor section and it will be of interest to your readership and contribute to improving asthma management in children with comorbidities. Thank you for your consideration.

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To the Editor,

Asthma is a prevalent health condition (incidence rate ~7.9%) among children in India. Besides leading to insufficient sleep, exhaustion, and steady deterioration in lung function, poorly controlled asthma makes it extremely difficult for these children to participate in some of the daily outdoor activities¹. Further, it is

the third most common reason for children being hospitalized and accounts for more than 10 million ‘lost school days’ annually¹.

An overlap between asthma, attention-deficit/hyperactivity disorder (ADHD), and/or autism spectrum disorder (ASD) has been reported in children². Kaas et al. found in a systematic review that out of 25 asthma-ADHD studies, 17 studies revealed a significant positive association, while one study showed a negative association. Asthma is more common in children with ASD, reportedly 21.6% of children with ASD were diagnosed with asthma of which 49.5% reported an acute exacerbation of asthma over 12 months. As such comorbidities are usually associated with complex clinical management, increased economic burden, and complex health outcomes, the presence of ADHD/ASD with asthma is challenging for patients and physicians. ASD is typically characterized by severe functional impairment, poor social interaction, and repetitive or stereotypical behavior, while ADHD is associated with functional impairment, poor cognitive development, and hyperactive-impulsive responses^{3,4}. These characteristics in either of the conditions, in addition to asthma, present challenges to physicians in planning a treatment regimen, as it impacts the patient’s adherence to medication.

Inhalation therapy is the key to effective asthma management. Delivering inhaled medications directly to the lungs has the advantage of the drug being delivered more effectively to the airways along with reduced systemic adverse effects.⁵ Use of the appropriate device(s) and patient preference for the device are critical for patient adherence which in turn plays an important role in controlling symptoms and thereby improving the quality of life in such patients⁵. Inhaler devices, including pressurized metered-dose inhalers (pMDIs) with or without added spacers, and dry powder inhalers (DPIs), are widely used to deliver medications directly to the lungs. However, these have certain disadvantages which limit their use by physicians and patients. Breath-actuated inhalers (BAI) have been recently introduced which overcome some of the drawbacks of pMDIs and DPIs.⁵

We evaluated the effectiveness of BAI in the management of asthma in three such pediatric patients between the age of 10-13 years who reported asthma exacerbations and poorly controlled symptoms. Two of them had severe ADHD while one was a child with autistic spectrum disorder (ASD) with ADHD. Previously, one child was treated with budesonide (100 µg) twice a day with pMDI plus spacer, while the other two children were treated with fluticasone (100 µg) plus salmeterol (25 µg) pMDI plus spacer, two puffs twice a day. All three patients were referred in view of poor control of symptoms with frequent exacerbations over 6 months with a low score on the asthma control test. While evaluating the technique of the drug delivery, all three patients were not cooperating sufficiently to take a minimum of six breaths with the pMDI plus spacer. After obtaining consent from the parents, all children were started on inhaled fluticasone (100) plus salmeterol (25) given via BAI (Synchrobreath®) for a period of one month with levosalbutamol BAI (Levolin®) as a reliever. Following the use of BAI, all patients improved on their asthma control test scores and were well controlled. Further evaluation using a patient satisfaction questionnaire revealed that the parents reported that BAI was easier to use, required lesser effort for breathing, children had a better understanding of using the device and was easier to maintain. All children followed up for 3 months and were well controlled with no need for using reliever medication during this period. This observation highlights the importance of technique of inhaler use in children with special needs.

In our study, we saw the key advantages of BAI which included overcoming the challenge of patient coordination of actuation with breathing, as BAI detects an inhalation attempt through the actuator and mechanically actuates the dosage in synchronization. This eliminates the need for pressing and breathing, which thereby removes technical dependency. BAI is compact, portable and obviates the need of a spacer. It provides the advantage of ease of use and assurance of a consistent dosage every time children use it, as it requires a low inspiratory flow rate for breath actuation. Decreased oropharyngeal deposition and increased lung deposition have also been noted with BAIs as the drug is released at a lower velocity.⁵ BAIs are also easy to clean and maintain.

In a study conducted in 51 children hospitalized with an acute exacerbation, more number of children could activate a BAI as compared to a DPI. Moreover, children with wheeze under 6 years of age, who were inept

at using the DPI, showed a worthwhile response to the BAI.⁵

Previously a few adult studies have demonstrated the advantages of BAI. In a prospective study, 10 stable adult patients with asthma were administered one puff of radiolabelled (99mTC) salmeterol and fluticasone propionate (SFC) (25/125 mcg) via either a BAI (Synchrobreathe®) or conventional pMDI and it was found that drug deposition in the lungs was significantly higher with Synchrobreathe® (22.33%) as compared with the conventional pMDI (17.32%).⁶

Due to the cognitive, physical, and sensory disabilities and device disadvantages stated above, children suffering from ADHD and ASD are likely to face difficulties in using their inhaler devices correctly, resulting in poor disease control. More studies are needed on newer inhalation devices in children with special needs. It is important to map the advantages of inhaler devices in terms of patient choice, satisfaction, and simplicity of use in addition to enhanced medication administration, less waste, and improved adherence. Guidelines must be established to determine patient groups that will benefit from a certain type of device. Based on the experience with these three pediatric cases with special health care needs, the authors recommend BAIs to be considered in treating asthma in patients with ASD and ADHD, given the growing number of children with these conditions.

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