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Letter to Editor

Appraising Digital Inhalers in Asthma: Small Average Gains, Heterogeneous Devices, Unanalyzed Subgroups

Suleman Khan*

Khyber Medical College, Peshawar, Pakistan

***Corresponding author:** Suleman Khan, Khyber Medical College, Peshawar, Pakistan

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Introduction

The recent systematic review of patient-facing digital inhalers for asthma in J Allergy and Clinical Immunology: In Practice combined 12 randomized trials [n≈2,500] and concluded that digital inhalers likely improve asthma control [mean Asthma Control Test difference 0.63; 44% vs. 39.8% achieving a ≥3-point improvement] and may reduce severe exacerbations with minimal harm [1]. These findings are encouraging, but several limitations reduce their clinical significance.

First, heterogeneity across populations and devices was not thoroughly examined. Adults, adolescents, and children were combined, but only three trials focused solely on pediatric participants, with just under half of the participants being under 18 years old [2]. Age-related differences in inhaler technique and digital literacy could affect the effectiveness of biofeedback; however, subgroup results by age were not provided. Additionally, the interventions varied greatly, from add-on sensors that silently record use to integrated devices that deliver real-time reminders. Evidence from pragmatic trials shows that adherence improves when digital inhalers include active biofeedback and clinician engagement: smartphone feedback increased controller adherence by about 12%, and clinician monitoring added another 10% [3]. Without stratification by device functionality and feedback intensity, the overall pooled effect may hide important differences.

Second, the benefit was modest, and certainty was low. Most trials were open-label and small, which increases the risk of performance and detection bias. The improvement in ACT of 0.63 points is well below the minimal clinically significant difference, and the number needed to treat was 23. Device malfunctions and connectivity issues were common, with about 12% of devices failing [1]. Similar problems are seen in COPD, where digital adherence platforms increased maintenance adherence by around 18% but did not improve quality of life or reduce exacerbations [2]. Remote monitoring for asthma slows the decline in adherence and reduces reliever use but has not yet demonstrated reductions in exacerbations or healthcare utilization [4].

Third, important confounders were not addressed. Digital interventions often include reminder alerts and education; observational studies show that adherence improves only when feedback is active and clinicians engage with patients [3]. Poor inhaler technique and low adherence to inhaled corticosteroids remain major drivers of asthma morbidity, yet baseline adherence, technique, and socioeconomic factors were not consistently measured [5]. Cost-effectiveness and equity issues were also not considered.

Conclusion

In conclusion, digital inhalers have potential for monitoring and supporting inhaler use, but stronger evidence is needed to guide practice. Future studies should be properly powered, blinded, and include prespecified subgroup analyses based on age, baseline control, and device functionality. They should evaluate clinically

meaningful outcomes, consider baseline adherence and technique, and assess cost-effectiveness. Combining digital inhalers with structured education and clinician-led feedback, as suggested by pragmatic studies [2,3], may provide more significant benefits. Until then, caution is advised when interpreting the modest effects observed in different trials.

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Acknowledgement

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Conflict of Interest

No Conflict of interest.

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