

Research Article

Evaluating the Relationship between FeNO and Pulmonary Function Tests in Asthmatic Patients

Sana Effendi*, Tulsi Patel and Asad Nasir

Lake Erie College of Osteopathic Medicine, Pennsylvania, USA

Abstract

Background: Asthma is a chronic inflammatory airway disease in which assessment of both airway inflammation and lung function is essential for diagnosis and management. Pulmonary Function Tests (PFTs), particularly Forced Expiratory Volume in one second (FEV₁), are widely used but may be costly and less accessible in some settings. Fraction of Exhaled Nitric Oxide (FeNO) has emerged as a potential non-invasive biomarker of airway inflammation, but its relationship to pulmonary function remains unclear.

Objective: To evaluate the relationship between FeNO levels and pulmonary function parameters in asthmatic patients.

Methods: A cross-sectional dataset of 31 asthmatic patients (ages 7-90 years) was analyzed. Patient demographics and potential confounders (smoking history, height, weight) were recorded. FeNO values (ppb) and FEV₁ % predicted were compared using linear regression analysis. Statistical significance was defined as $p < 0.05$.

Results: Regression analysis showed no significant correlation between FeNO and FEV₁ % predicted ($p = 0.937$). No discernible linear trend was observed between airway inflammation and lung function.

Conclusion: FeNO is not a reliable indicator of spirometric indices or disease severity in asthma. While valuable as a marker of eosinophilic inflammation, FeNO should be interpreted alongside pulmonary function tests and clinical assessment. Larger, longitudinal studies stratified by asthma phenotype are needed to better clarify this relationship.

Keywords: Asthma; FeNO; FEV₁; Fraction of exhaled nitric oxide; Pulmonary function tests; Spirometry

*Corresponding author: Sana Effendi, Lake Erie College of Osteopathic Medicine, Pennsylvania, USA, Email: SEffendi99606@med.lecom.edu

Citation: Effendi S, Tulsi Patel T, Nasir A (2025) Evaluating the Relationship between FeNO and Pulmonary Function Tests in Asthmatic Patients. HSOA J Community Med Public Health Care 12: 167.

Received: September 09, 2025; **Accepted:** September 22, 2025; **Published:** September 30, 2025

Copyright: © 2025 Effendi S, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Introduction

Asthma is a chronic inflammatory airway disease characterized by variable airflow obstruction and bronchial hyperresponsiveness, affecting an estimated 262 million people worldwide [1]. Accurate assessment of airway inflammation and lung function is crucial for effective diagnosis and management. Pulmonary Function Tests (PFTs), including spirometry and Forced Expiratory Volume in one second (FEV₁), are standard tools to assess airflow limitation [2]. However, PFTs are resource-intensive and not universally available.

Fraction of Exhaled Nitric Oxide (FeNO) is a simple, non-invasive biomarker of eosinophilic airway inflammation. Elevated FeNO levels reflect upregulation of Inducible Nitric Oxide Synthase (iNOS) in airway epithelial cells in response to inflammatory cytokines [3], and have been used to guide corticosteroid therapy and adherence monitoring [4,5]. Yet, the correlation between FeNO and pulmonary function remains variable. While some studies suggest moderate associations between FeNO and spirometric indices, others report inconsistent results [6,7].

This study aimed to evaluate the relationship between FeNO and pulmonary function in asthmatic patients to determine whether FeNO can reliably predict lung function impairment.

Methods

Study Design and Participants

A cross-sectional study was conducted using data from 31 patients with physician-confirmed asthma. Ages ranged from 7 to 90 years. Patient demographics and clinical characteristics, including smoking history, height, and weight, were recorded to account for potential confounders.

Measurements

- **Fractional Exhaled Nitric Oxide (FeNO):** Measured in parts per billion (ppb).
- **Pulmonary Function:** Assessed via FEV₁ % predicted.

Statistical Analysis

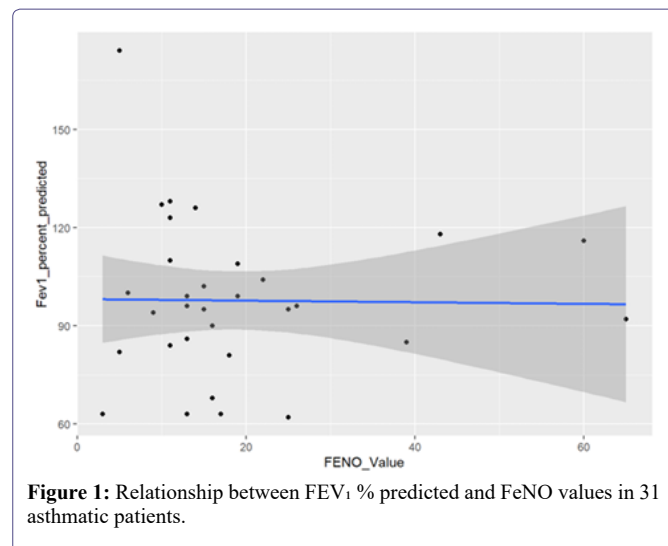
Linear regression was performed to assess the relationship between FeNO and FEV₁ % predicted. Statistical significance was defined as $p < 0.05$. Scatter plots with best-fit regression lines were used to illustrate results.

Results

The linear regression analysis showed no significant correlation between FeNO and FEV₁ % predicted. The regression coefficient was non-significant ($p = 0.937$), with no discernible linear trend (Figure 1).

Discussion

This study demonstrated that FeNO is not a reliable surrogate for pulmonary function parameters in asthmatic patients. Although FeNO



reflects eosinophilic airway inflammation, it does not correlate significantly with spirometric indices such as FEV₁ % predicted.

Several factors may explain this discrepancy:

- **FeNO Variability:** Influenced by age, BMI, environmental exposures, and therapy adherence.
- **Mechanistic Differences:** FeNO reflects inflammation, whereas FEV₁ measures airflow limitation. In non-eosinophilic asthma phenotypes, inflammation and obstruction may not align.

These findings align with previous studies indicating that FeNO should complement rather than replace spirometry in asthma assessment [5-7].

Limitations

- Small sample size reduced statistical power.
- Single cross-sectional design limited longitudinal insight.
- Rural cohort may reduce generalizability.

Clinical Implications

Asthma management should integrate both inflammatory markers and functional measures. FeNO may guide anti-inflammatory therapy, but spirometry remains necessary for evaluating airflow limitation.

Conclusion

FeNO is a useful biomarker of eosinophilic airway inflammation but not a reliable predictor of pulmonary function or asthma severity. A comprehensive approach to asthma management requires both FeNO and pulmonary function testing.

Future Directions

Future studies should include larger cohorts, adopt longitudinal designs, and stratify patients by asthma phenotype (eosinophilic vs. neutrophilic) to clarify the clinical utility of FeNO relative to spirometry.

References

1. World Health Organization (2024) Asthma. World Health Organization, Geneva, Switzerland.
2. Pellegrino R, Viegi G, Brusasco V, Crapo RO, Burgos F, et al. (2005) Interpretative strategies for lung function tests. *Eur Respir J* 26: 948-968.
3. Barnes PJ (1995) Nitric oxide and airway disease. *Ann Med* 27: 389-393.
4. Dweik RA, Boggs PB, Erzurum SC, Irvin CG, Leigh MW, et al. (2011) An official ATS clinical practice guideline: Interpretation of exhaled nitric oxide levels (FeNO) for clinical applications. *Am J Respir Crit Care Med* 184: 602-615.
5. Smith AD, Cowan JO, Filsell S, McLachlan C, Monti-Sheehan G, et al. (2004) Diagnosing asthma: Comparisons between exhaled nitric oxide measurements and conventional tests. *Am J Respir Crit Care Med* 169: 473-478.
6. Rao DR, Phipatanakul W (2016) An overview of fractional exhaled nitric oxide and children with asthma. *Expert Rev Clin Immunol* 12: 521-530.
7. Shaw DE, Berry MA, Thomas M, Green RH, Brightling CE, et al. (2007) The use of exhaled nitric oxide to guide asthma management: A randomized controlled trial. *Am J Respir Crit Care Med* 176: 231-237.



- Advances In Industrial Biotechnology | ISSN: 2639-5665
- Advances In Microbiology Research | ISSN: 2689-694X
- Archives Of Surgery And Surgical Education | ISSN: 2689-3126
- Archives Of Urology
- Archives Of Zoological Studies | ISSN: 2640-7779
- Current Trends Medical And Biological Engineering
- International Journal Of Case Reports And Therapeutic Studies | ISSN: 2689-310X
- Journal Of Addiction & Addictive Disorders | ISSN: 2578-7276
- Journal Of Agronomy & Agricultural Science | ISSN: 2689-8292
- Journal Of AIDS Clinical Research & STDs | ISSN: 2572-7370
- Journal Of Alcoholism Drug Abuse & Substance Dependence | ISSN: 2572-9594
- Journal Of Allergy Disorders & Therapy | ISSN: 2470-749X
- Journal Of Alternative Complementary & Integrative Medicine | ISSN: 2470-7562
- Journal Of Alzheimers & Neurodegenerative Diseases | ISSN: 2572-9608
- Journal Of Anesthesia & Clinical Care | ISSN: 2378-8879
- Journal Of Angiology & Vascular Surgery | ISSN: 2572-7397
- Journal Of Animal Research & Veterinary Science | ISSN: 2639-3751
- Journal Of Aquaculture & Fisheries | ISSN: 2576-5523
- Journal Of Atmospheric & Earth Sciences | ISSN: 2689-8780
- Journal Of Biotech Research & Biochemistry
- Journal Of Brain & Neuroscience Research
- Journal Of Cancer Biology & Treatment | ISSN: 2470-7546
- Journal Of Cardiology Study & Research | ISSN: 2640-768X
- Journal Of Cell Biology & Cell Metabolism | ISSN: 2381-1943
- Journal Of Clinical Dermatology & Therapy | ISSN: 2378-8771
- Journal Of Clinical Immunology & Immunotherapy | ISSN: 2378-8844
- Journal Of Clinical Studies & Medical Case Reports | ISSN: 2378-8801
- Journal Of Community Medicine & Public Health Care | ISSN: 2381-1978
- Journal Of Cytology & Tissue Biology | ISSN: 2378-9107
- Journal Of Dairy Research & Technology | ISSN: 2688-9315
- Journal Of Dentistry Oral Health & Cosmesis | ISSN: 2473-6783
- Journal Of Diabetes & Metabolic Disorders | ISSN: 2381-201X
- Journal Of Emergency Medicine Trauma & Surgical Care | ISSN: 2378-8798
- Journal Of Environmental Science Current Research | ISSN: 2643-5020
- Journal Of Food Science & Nutrition | ISSN: 2470-1076
- Journal Of Forensic Legal & Investigative Sciences | ISSN: 2473-733X
- Journal Of Gastroenterology & Hepatology Research | ISSN: 2574-2566
- Journal Of Genetics & Genomic Sciences | ISSN: 2574-2485
- Journal Of Gerontology & Geriatric Medicine | ISSN: 2381-8662
- Journal Of Hematology Blood Transfusion & Disorders | ISSN: 2572-2999
- Journal Of Hospice & Palliative Medical Care
- Journal Of Human Endocrinology | ISSN: 2572-9640
- Journal Of Infectious & Non Infectious Diseases | ISSN: 2381-8654
- Journal Of Internal Medicine & Primary Healthcare | ISSN: 2574-2493
- Journal Of Light & Laser Current Trends
- Journal Of Medicine Study & Research | ISSN: 2639-5657
- Journal Of Modern Chemical Sciences
- Journal Of Nanotechnology Nanomedicine & Nanobiotechnology | ISSN: 2381-2044
- Journal Of Neonatology & Clinical Pediatrics | ISSN: 2378-878X
- Journal Of Nephrology & Renal Therapy | ISSN: 2473-7313
- Journal Of Non Invasive Vascular Investigation | ISSN: 2572-7400
- Journal Of Nuclear Medicine Radiology & Radiation Therapy | ISSN: 2572-7419
- Journal Of Obesity & Weight Loss | ISSN: 2473-7372
- Journal Of Ophthalmology & Clinical Research | ISSN: 2378-8887
- Journal Of Orthopedic Research & Physiotherapy | ISSN: 2381-2052
- Journal Of Otolaryngology Head & Neck Surgery | ISSN: 2573-010X
- Journal Of Pathology Clinical & Medical Research
- Journal Of Pharmacology Pharmaceutics & Pharmacovigilance | ISSN: 2639-5649
- Journal Of Physical Medicine Rehabilitation & Disabilities | ISSN: 2381-8670
- Journal Of Plant Science Current Research | ISSN: 2639-3743
- Journal Of Practical & Professional Nursing | ISSN: 2639-5681
- Journal Of Protein Research & Bioinformatics
- Journal Of Psychiatry Depression & Anxiety | ISSN: 2573-0150
- Journal Of Pulmonary Medicine & Respiratory Research | ISSN: 2573-0177
- Journal Of Reproductive Medicine Gynaecology & Obstetrics | ISSN: 2574-2574
- Journal Of Stem Cells Research Development & Therapy | ISSN: 2381-2060
- Journal Of Surgery Current Trends & Innovations | ISSN: 2578-7284
- Journal Of Toxicology Current Research | ISSN: 2639-3735
- Journal Of Translational Science And Research
- Journal Of Vaccines Research & Vaccination | ISSN: 2573-0193
- Journal Of Virology & Antivirals
- Sports Medicine And Injury Care Journal | ISSN: 2689-8829
- Trends In Anatomy & Physiology | ISSN: 2640-7752

Submit Your Manuscript: <https://www.heraldopenaccess.us/submit-manuscript>