

# A Cheap, Useful but Forgotten Tool for Diagnosing Adult-Onset Asthma: PEF Meter

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**Abstract:** *Although a detailed medical history including characteristic information on asthma symptoms is the main tool in the diagnosis of asthma, pulmonary function tests are also required to obtain exact diagnosis of this disease. However, delay in diagnosis may arise in some cases of adult-onset asthma, in patients who do not have obvious asthma symptoms when they arrive at the hospital and in cases with normal pulmonary function tests. We describe a case of late onset asthma which was diagnosed lately with the help of PEF meter and had difficulty of diagnosis because of the normal pulmonary function tests.*

**Key Words:** Asthma, adult-onset asthma, diagnosis, PEF meter, spirometry

## 1. Introduction

Asthma is generally accepted as a disease of the childhood. However, asthma symptoms can appear at any time in life. Individuals who develop asthma as adults are said to have adult-onset asthma. The incidence of asthma developing at 65 years old or later is 60 to 100 per 100.000 cases, which is not very different from the incidence of this disease in the youth or middle ages (1). However, there are some reasons which may cause physicians to miss diagnosis of adult-onset asthma or may cause delays in the exact diagnosis of the disease (2). Several potential explanations are suggested for the reasons that cause difficulties in the diagnosis of adult-onset asthma (3). First of all, allergic factors play more important role in the development of childhood-onset asthma, but asthma that starts in adulthood differs from childhood-onset asthma in that it is often non-atopic (4). Adults tend to have lower lung capacity after middle ages because of the changes in the respiratory muscles and stiffening of the chest wall. These changes are associated with ageing and may hide some findings of asthma. The most common elderly diseases such as gastroesophageal reflux, hiatal hernia, cardiac diseases and chronic obstructive pulmonary disease may have many of the same symptoms as asthma or change characteristic features of asthma (5, 6). In addition, the patients may have no symptoms at all and pulmonary functions tests can be absolutely normal when they visit their physician, which will also make diagnosing asthma even more difficult.

The diagnosis of asthma is based on medical history of the patient, and some findings such as intermittent shortness of breath, coughing, and wheezing may orient physicians for the diagnosis of this disease. However, most of the physicians have the tendency to support their findings with pulmonary function tests and prescribe medications of asthma after objective proofs. Spirometry is the recommended tool for the diagnosis of asthma and evaluation of the airway obstruction, but it may fail to demonstrate airway obstruction if the patient is asymptomatic on admission (7). Bronchoprovocation tests are the second choice for those patients who have symptoms of asthma but normal

spirometry testing. However, these tests can be performed only in specialized laboratories and not everyone should have bronchoprovocation challenge testing because there is a risk which may lead to a potentially severe asthma attack (8). On the other hand, there is a test called as peak expiratory flow (PEF) monitoring, valuable to assess degree of diurnal variation in lung function which is a well-known characteristic of asthma. PEF meters are used for this purpose. During a monitoring period of 15 days, the patient should record PEF measurements twice a day: before the bronchodilator in the morning (06:00 AM-09:00 AM) and after using the bronchodilator in the evening (18:00 PM-21:00 PM) (9). Patient should choose the best value among three attempts both in the morning and in the evening. Diurnal PEF variability between morning and evening is expressed as a percentage by using the international formula (Figure 1). Patients who have a diurnal variation in PEF of more than 20% at least for 3 days or more than 15% at least for 4 days, or an average of diurnal variation in PEF of more than 10% for all days are considered to be asthmatic people (9).

A 76-year-old female presented to the pulmonology polyclinic of our hospital with intermittent dyspnea, coughing and wheezing affecting her especially for the last 4 years. Chest auscultation revealed normal lung sounds. Posteroanterior and lateral radiographs of the chest were including normal findings (Figure 2a). She had no allergies. She had a history of several visits to her doctor because of the same complaints and had been prescribed symptomatic therapy for those periods. She mentioned that spirometry was performed for at least 4 times in the past and as told to her all had normal spirometric values. Spirometry which was ordered by us again showed no ventilatory defect (Figure 2b). However, her medical history was suggesting a presence of the adult-onset asthma, so bronchoprovocation challenge testing was offered to her. The patient was anxious about not to perform this test because of the increased risk of bronchospasm and did not sign a written consent form. Then, PEF monitoring was explained to the patient in details and she accepted to buy a PEF meter (prices of PEF meters range between 15 to 35 United States

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Dollars). She measured PEF values for 15 days according to instructions of the test (**Figure 2c**). Diurnal PEF variability between morning and evening was assessed more than 20% for 6 days and she was diagnosed as adult-onset asthma. Inhaled corticosteroids were prescribed and she was free of all previous respiratory symptoms at 3 and 6 months of the treatment.

## 2. Conclusion

PEF meters are inexpensive and portable devices for monitoring diurnal PEF variability. Physicians should keep in mind that, these cheap devices may play an important role in patients who do not have obvious asthma symptoms when they arrive at the hospital and in cases with normal pulmonary function tests, particularly for diagnosis of adult-onset asthma.

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Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

MU: Concept and design of the study, acquisition of data, analysis and interpretation of data, revising the article critically for important intellectual content, final approval of the version to be published.

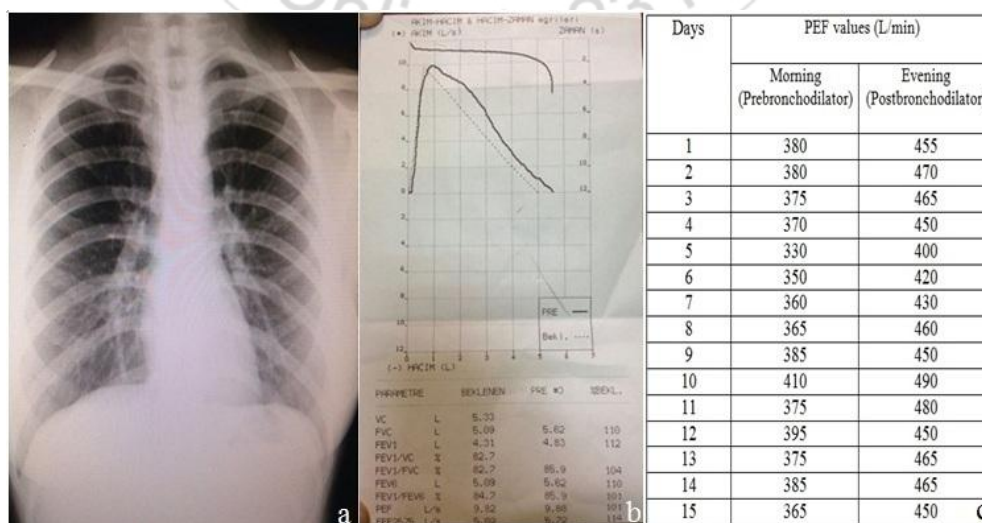
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$$\text{Daily PEF variability} = \frac{\text{PEF}_{\text{evening}} - \text{PEF}_{\text{morning}}}{1/2 (\text{PEF}_{\text{evening}} + \text{PEF}_{\text{morning}})} \times 100$$

**Figure 1:** Formulation of diurnal PEF variability



**Figure 2:** (a) Posteroanterior chest radiograph of the patient on admission. (b) Spirometry of the patient. (c) PEF levels of the patient