Original Research

Assessment of radiographic findings among asthma patients

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ABSTRACT:
Background: A novel and intriguing discovery is the variation in rib slope between asthma patients and non-asthmatics. The goal of this study was to ascertain whether the decreased horizontal rib curve on a chest radiograph of an asthma patient is a distinguishing feature. **Materials and Methods:** The study included 100 participants with asthma and 100 people without asthma. The 100 non-asthmatic patients were diagnosed with gastroenteritis (n=9), trauma (n=18), urinary tract infection (n=5), depression (n=4), drug overdose (10), rhinitis/pharyngitis/tonsillitis (10), intracranial haemorrhage (n=11), headache/dizziness (10), abdominal pain (10), maylagia/neuralgia (n=6), upper gastrointestinal bleeding (7), infectious diarrhoea Lines were drawn horizontally along the sixth rib's midpoint and up to the place where it connects with the thoracic cage after looking at chest radiographs. The angle of rib curve (ARC), which lies between these two lines, was coined. The student's t-test was used to compare the ARCs between groups. The statistical programme SPSS was used to analyse the data. **Results:** The asthma group consisted of 46 males and 54 females with a mean age of 49.3 years. The non-asthma group consisted of 56 males and 44 females with a mean age of 37.5 years. The ARC was smaller in asthma patients than in non-asthma patients. In the asthma group, the mean male ARC was smaller than the mean female ARC; however, there was no statistical difference in gender in the non-asthma group (P = 0.405). **Conclusions:** In everyday practise, the current photographic trait may be helpful for suspecting a bronchial asthma diagnosis.
Key words: Asthma, gender, ribs, thoracic cage

INTRODUCTION

Chest tuberculosis (CTB) is a widespread problem, especially in our country where it is one of the leading causes of mortality.[1,2] The term "severe asthma" does not relate to a specific pathobiological entity or even a specific phenotype, but rather occurs in those patients who are unable to maintain control of their disease, never attain control of their disease, or who require treatment with high dose inhaled or systemic corticosteroids as well as a second controller medication.[3] Although this group represents only 5–10% of asthmatics as a whole, they account for nearly 50% of the healthcare costs related to asthma, thus any strategies that can improve the diagnosis and management of these patients may have a significant impact both on their quality of life and on the economic burden of the disease.

Although chest radiography and computed tomography (CT) remain the primary imaging methods used in the clinical and research evaluation of asthmatic patients, there have been parallel advancements in a growing range of imaging techniques that are now available in both research and clinical arena. Modalities such as magnetic resonance imaging (MRI), endobronchial ultrasound (EBUS), optical coherence tomography (OCT) and positron emission tomography (PET) are among the techniques that can be used in pulmonary imaging of asthma patients to assess both structure and function, so that these parameters can be related back to more traditional clinical parameters for a broadened, personalized understanding of the individual patient.[4,5] Imaging characteristics are now providing an understanding of endotypes and further define asthmatic phenotypes[6,7] and can potentially serve as

predictive and response biomarkers.[8] Lung imaging can be used to assess response to standard treatment such as inhaled corticosteroids, newer pharmacologic therapies including biologic agents, and non-pharmacologic therapy such as bronchial thermoplasty.[9,10]

Hence, this study was conducted to assess radiographic findings among asthma subjects.

MATERIAL AND METHODS

The study included 100 participants with asthma and 100 people without asthma. The 100 non-asthmatic patients were diagnosed with gastroenteritis (n=9), trauma (n=18), urinary tract infection (n=5), depression (n=4), drug overdose (10), rhinitis/pharyngitis/tonsillitis (10), intracranial haemorrhage (n=11), headache/dizziness (10), abdominal pain (10), maylagia/neuralgia (n=6), upper gastrointestinal bleeding (7), infectious diarrhoeaLines were drawn horizontally along the sixth rib's midpoint and up to the place where it connects with the thoracic cage after looking at chest radiographs. The angle of rib curve (ARC), which lies between these two lines, was coined. The student's t-test was used to compare the ARCs between groups. The statistical programme SPSS was used to analyse the data.

RESULTS

The asthma group consisted of 60 males and 40 females with a mean age of 51.4 years. The non-asthma group consisted of 65 males and 35 females with a mean age of 36.9 years. The ARC was smaller in asthma patients than in non-asthma patients. In the asthma group, the mean male ARC was smaller than the mean female ARC; however, there was no statistical difference in gender in the non-asthma group (P = 0.301).

Table 1: Distribution of patients

Variable		Asthma group	Non-Asthma group
Number		100	100
Mean age (years)		51.4	36.9
Gender	Males	60	65
	Females	40	35

Table 2: Comparison of ARC

ARC	Asthma group	Non-Asthma group
Mean	13.1	15.6

DISCUSSION

Over the past several decades many investigators have shown that multiple imaging modalities can be used to reliably differentiate those with severe asthma from those with milder disease, and increasingly there is discussion of what role imaging may play in both diagnosing and monitoring severe asthmatics. As there have been multiple prior reviews of this literature, in this review, we briefly discuss both older, but important, imaging studies of asthmatics, and place particular emphasis on recent advances in the imaging of severe asthmatics.[11,12,13]

The asthma group in this study had a mean age of 51.4 years and included 60 males and 40 females. The non-asthma group had a mean age of 36.9 years and included 65 men and 35 women. Patients with asthma had smaller ARCs than those without the condition. The mean male ARC was lower in the asthma group than the mean female ARC, but there was no statistically significant difference in gender in the non-asthma group (P = 0.301). Inhalationin asthmatic patients caused the upper anterior rib cage to move continuously outward, resulting in horizontally aligned ribs on chest radiographs. The respiratory muscles are entirely relaxed during expiration in non-asthmatics, but not in asthma patients. As a result, rather than being the cause of asthma, a smaller ARC may be the physical result. This unique discovery has never been before documented.

Halaby et al[14] established whether chest radiographic findings suggestive of lower airway obstruction (LAO) disease support the diagnosis of asthma in pediatric patients with persistent cough in an outpatient setting. 180 patient charts were reviewed. The patients were children aged 1 to 18 years referred over a 3-year period to a pediatric pulmonary subspecialty clinic for evaluation of cough lasting ≥ 4 weeks. Chest radiographic images obtained after the initial evaluation of 90 patients diagnosed with cough-variant asthma and 90 patients diagnosed with persistent cough from nonasthma origins were compared with radiologic findings of a control group consisting of patients with a positive tuberculin skin test and no respiratory symptoms. Increased peribronchial markings/peribronchial cuffing and hyperinflation were considered radiographically suggestive findings of LAO disease. Children diagnosed with cough-variant asthma at the initial evaluation had higher rates of chest radiographic findings suggestive of LAO disease (30.00%) than children with persistent cough from other causes (17.80%) or those with a positive tuberculin skin test and no respiratory symptoms (8.16%) (overall P value = 0.0063). They also had higher rates of spirometry abnormalities suggestive of an LAO defect. Children with chest radiographic findings suggestive of LAO disease were found to be younger than those with normal chest radiographic findings (5.0 ± 2.7 years vs 8.6 ± 4.7 years; P < 0.0001). This study suggested that chest radiographic findings indicative of an LAO in correlation with the clinical presentation can support the diagnostic suspicion of asthma, especially in younger children unable to perform spirometry.

CONCLUSION

In everyday practise, the current photographic trait may be helpful for suspecting a bronchial asthma diagnosis.

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