



ASSESSMENT OF ASTHMA CONTROL USING ASTHMA CONTROL TEST AND ITS CORRELATION WITH SPIROMETRY

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ABSTRACT

Introduction: Asthma is a common non-communicable disease. It is not curable but controllable disease. Goal of our study was to find asthma control in using ACT scores and to determine its relationship with lung function parameters.

Aims: To compare results of Asthma control test with spirometry in the assessment of patients with asthma

Study Design: Study was a cross-sectional analytical study done in diagnosed cases of bronchial asthma coming to Respiratory Medicine Department of a tertiary care hospital. Study was conducted over a period of 18 months and total 100 cases were included in the study.

Methods and Material: Patients were first provided with AaCT questionnaire. Then, spirometry was performed using portable spirometer. Results of both were compared.

Results: In our study, 68% subjects had well controlled asthma while 32% subjects had uncontrolled asthma as per Asthma control test. Based on spirometric analysis (FEV1), 57% had well controlled while 43% had uncontrolled asthma. The correlation between the Asthma Control Test and FEV1 was not significant.

Conclusions: The present study showed that asthma is poorly controlled among 32% of the study subjects. ACT provides simple tool to assess asthma control but correlates poorly lung function parameters. Hence both need to be monitored by clinicians assessing asthma control in clinical practice.

KEYWORDS : Asthma control, Asthma control test, FEV1, Spirometry

INTRODUCTION

Asthma is a major non-communicable disease that affects 1 to 18% of the population in different countries¹. According to WHO estimates, about 235 million people currently suffer from asthma² and in India, about 32 million adults were asthmatics for the 2011 population of around 415 million³. Contrary to previous thought that asthma is a public health problem just for high-income countries, incidence is rising in developing countries and most asthma-related deaths occur in low and middle income countries².

It is important to remember that as there is no single test to define asthma control, several tools have been used to measure control. One of it is the Asthma control test (ACT). It is a 5 question questionnaire developed by Nathan and colleagues in 2004⁴. It is a validated, reproducible and reliable tool in assessing asthma control⁵.

Spirometry as a measure of lung function provides information that is not provided by other outcome variables. However, it is not clear how spirometry correlates with ACT as a complementary measure in the assessment of persons with asthma. The present study is aimed at assessing asthma control using a validated ACT among diagnosed asthmatics and to assess how it relates to lung function parameters. Spirometry may not be feasible especially in the rural Indian setting, we wanted to know that can ACT replace spirometry for deciding treatment change or need for referral to a specialist.

MATERIALS AND METHODS:

The study was cross-sectional analytical study done in diagnosed cases of bronchial asthma coming to a tertiary care center in Pune. Total 100 cases, more than 18 years old, diagnosed with asthma and who were on inhalers were included in the study. Study duration was 18 months. Asthmatics that had serious co-morbid conditions or who were unable to perform PFT properly were excluded from the study. Patients were given Asthma Control Test (ACT) which is 5 question questionnaire with 1 to 5 points to each question. Each of the five questions of ACT was explained to the patients. Score of 25 points indicates complete

control, from 20 to 24 points good control and less than 20 points poor control. Then, spirometry was performed using portable spirometer. Results of both were compared.

The collected data was analysed using SPSS software. The Correlation between levels of asthma control by ACT scores and lung function parameters were assessed using Spearman correlation coefficient.

RESULTS

Total 100 participants (65 male and 35 female) were recruited in the study. Mean age (year) of all study participants was 40.55 ± 12.61 .

On administering the Asthma control test, it was found that 68% subjects had well controlled asthma while 32% subjects had uncontrolled asthma. The mean value for Asthma control test was 20 ± 2.45 (Table-1).

Table 1: Level of control by asthma control test

Level of control	Poor (ACT score <20)	Good (ACT score 20 or more)
Total number	32	68
Percentage	32%	68%

Based on spirometric analysis (FEV1), 43% of the patients had uncontrolled asthma while 57% had asthma under control. The mean value for FEV1 was 80.13 ± 11.89 (Table-2).

Table 2: Level of control as per spirometry

Level of control	Uncontrolled	Controlled
Total number	43	57
Percentage	43%	57%

The Spearman correlation coefficient in the relationship between Asthma Control Test and FEV1 (% Predicted Value) was +0.04. The intra-class correlation value η (eta) was found to be <0.034. The correlation between the Asthma Control Test and FEV1 was not significant as illustrated in table 3.

Table 3: Correlation between act and spirometry

		ACT score	FEV1 %
ACT score	Correlation Coefficient	1.000	.037
	Sig. (2-tailed)	.	.715
	N	100	100
FEV1 %	Correlation Coefficient	.037	1.000
	Sig. (2-tailed)	.715	.
	N	100	100

Intra class Correlation Coefficient

	Intra- class Correlationnb	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.034a	-.162	.228	1.071	99	99	.367
Average Measures	.066c	-.388	.372	1.071	99	99	.367

DISCUSSION

The mean ACT score and FEV1 % for 100 participants in our study was 20 ± 2.45 and 80.13 ± 11.89 respectively. If we see other studies, the mean ACT score and FEV1 were 20.886 and 72% in Raikar *et al.*, 18 and 95.1% Francisco Javier Álvarez-Gutiérrez *et al.*

In the analysis, it was found that 32 (32%) of asthma patients had poorly controlled asthma and 68 (68%) had well controlled asthma as per asthma control test. These findings do not corroborate with those of Jumbo Johnbull *et al.* and Mendoza *et al.* who reported that only 37% and 28% had well-controlled asthma. In study by Raikar *et al.*, 9 (20%) of asthma patients had poorly controlled asthma and 35 subjects (80%) had well controlled asthma according to ACT.

As per spirometric analysis of subjects, 43(43%) had uncontrolled asthma and 57 (57%) subjects had their asthma under control.

In our study, the correlation between the Asthma Control Test and pulmonary function tests was not significant. This is in accordance with the findings reported by Jumbo Johnbull *et al.*, Raikar *et al.*, G. Senna *et al.*¹⁰, Zhou Xin *et al.*¹¹, Green *et al.*¹², Reznik *et al.*¹³, and Osborne *et al.*¹⁴. Despite FEV1 reliably reflecting the degree of bronchial obstruction, the poor correlation may be due to well-known individual variability in the perception of symptoms. This fact may be explained by the lack of specificity of asthma symptoms and to differences in the magnitude and time course of the response to treatment.

However, study done by Mendoza *et al.*¹⁵, showed a significant correlation between FEV1 and ACT scores. This was likely due to higher sample size and it was cohort prospective study in contrast to our study which was cross-sectional. S.P. Chalise *et al.*¹⁵ also found significant positive correlations between C-ACT score and FEV1 but this too was a prospective study and was done with childhood asthma control test.

CONCLUSIONS

The present study showed that asthma was poorly controlled among 32% of the study subjects. It also showed that lung function parameters correlate poorly with Asthma Control Test (ACT) scores. These results underline that asthma symptoms and lung function parameters represent different domains of asthma and they correlate poorly in patients, so both need to be monitored by clinicians assessing asthma control in clinical practice.

Despite FEV1 reliably reflecting the degree of bronchial obstruction, in our patients, it did not correlate with the ACT score. Reason for poor correlation may be individual variability in the perception of symptoms. Other reason for this can be in many of patients, asthma is predominantly associated with small airway obstruction which is not reflected by FEV1.

Also, asthma has different phenotype expressions, and each phenotype expression can show a specific combination of different control parameters. So we consider that for a complete assessment of the degree of control of asthma in each patient, it is necessary to combine these measurements. It needs to be noted that a patient's knowledge about asthma may influence the accuracy of ACT. Therefore, in their management of asthma, patients should be further educated about asthma to enhance the accuracy of ACT.

ACT is a patient centred instrument and can be completed in a clinic or at home. It allows patients to monitor their asthmatic condition easily and therefore will improve patient's adherence to medication, communication between patient and physician, physician's assessment of asthma control, patient's satisfaction and treatment outcomes.

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