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Study of Pulmonary Function Test in Bronchial Asthma Patients

Dr.Gurunath Birajdar,[1] Dr. Amey Paranjape,[2] Dr. Meera Nagavekar,[3]
[1]*Assistant Professor, Department of Physiology, B K L Walawalkar Rural Medical College, Hospital And Reasearch Centre, Sawarde, Chiplun, Maharashtra, India.*
[2]*Assistant Professor, Department of Pulmonary Medicine, B K L Walawalkar Rural Medical College, Hospital And Reasearch Centre, Sawarde, Chiplun, Maharashtra, India.*
[3]*Professor And Head, Department of Physiology, B K L Walawalkar Rural Medical College, Hospital And Reasearch Centre, Sawarde, Chiplun, Maharashtra, India.*

Abstract: *Asthma is a complex, recurrent disease of the airways that causes shortness of breath , wheezing and cough(particularly at night or early in the morning). Asthma is episodic in nature and usually reversible, either spontaneously or with treatment. The present study was undertaken to assess the pulmonary function status of bronchial asthma patients. The results are based on 40 asthmatic patients and 40 healthy subjects (Control group) in the age range of 20-70 years .To study pulmonary functions in asthmatic patients FEV1,FVC, FEV1/FVC RATIO recorded on each subject. Pulmonary function test was carried out using RMS Helios 401 spirometer, Chandigarh. The present study showed decreased lung function parameters in asthma patients as compared to control but the difference was statistically significant. So, knowledge of this study helpful in treatment of asthma.*

Keywords: *Bronchial asthma, pulmonary function test, RMS Helios- 401 spirometer.*

I. Introduction

Asthma is a complex, recurrent disease of the airways that causes shortness of breath, wheezing, and cough (particularly at night or early in the morning). Asthma is episodic in nature and usually reversible, either spontaneously or with treatment. However, chronic inflammation, associated with persistent symptoms, may contribute to airway remodeling that may not be completely reversible. Airflow limitation occurs as a result of varying degrees of airway hyperresponsiveness, airway edema and bronchoconstriction.

Pulmonary function test (PFT) , is a non-invasive test, used to detect air flow limitation and/or lung volume restriction. Assessment of ventilator function is an important investigation because early detection of functional impairment and its appropriate treatment will help to reduce morbidity and mortality related to disease.

Long-term deterioration of lung function in asthmatic subjects has been described in various studies. For a long time it has been believed that asthma is characterized by totally reversible airway obstruction. Now it is established that prolonged airway inflammation regulated by a variety of inflammatory cells and mediators is the central mechanism in the pathogenesis of asthma. Inflammation leads to injuries and repair including regeneration and replacement by connective tissue. It has been hypothesized that chronic airway inflammation can lead to airway remodeling and in the long term to irreversible airway obstruction. The consequence of this process could be deterioration in pulmonary function. Asthma is characterized by the presence of reversible airflow obstruction ; however, irreversible airflow obstruction develops in some patients. Morever, accelerated loss of lung function over time has been reported in groups of patients with asthma in longitudinal prospective and retrospective studies.

(*Lange et al, 1998, Peat et al, 1987, Sears et al, 2003, Cover et al, 2004, Pascual et al, 2005)* reported that clinically , airflow obstruction in asthma often is not fully reversible , and many asthmatic subjects experience an accelerated and progressive loss of lung function over time. *Lange et al(1998)* proved that adults with asthma have substantially greater decliunes in forced expiratory volume in 1s (FEV1) over time in comparison with healthy subjects. Accelerated decline in lung function does not occur in all patients. The risk factors identified for accelerated decline in lung function include young age , male gender *(Cover et al, 2004),* duration of disease*(Lee et al, 2007)* more prominent eosinophilic airway inflammation (*Cover at al,2004),* asthma exacerbations *(Bai et al, 2007),* and smoking*(Lee et al, 2007).* Recent studies of patients with asthma selected from the general population have shown increased mortality in subjects with reduced ventilator function and have thus underlined the importance of preservation of normal lung function. *(Silverstien, 1994; Lange, 1996; Huovinen,1997).* In the present investigation an attempt has been made to study pulmonary function of bronchial asthma patients. Little is known about lung function of bronchial asthma patients in this part of the region as patients are treated on the basis of clinical history and signs and symptoms and their lung function is rarely assessed.

II. Materials & Methods

The present cross sectional study has been conducted on bronchial asthma patients to study their pulmonary function status. 40 bronchial asthma patients and 40 healthy subjects (control) have been studied in the age range 20-70 years. Data on patients have been collected from B K L Walawalkar Rural Medical College & General Hospital, Sawarde, Chiplun, Ratnagiri. Selected patients and normal subjects were explained the purpose of the study and need of cooperation was emphasized. All the subjects participated in the study voluntarily. Pulmonary Function Tests (PFT): pulmonary function tests were done on all the subjects using RMS Helios-401 spirometer, Chandigarh. Following parameters were recorded for analysis.

1**. FEV1**- Forced expiratory volume in one second.

2**. FVC**- Forced vital capacity. The maximum volume of air forcibly expired from total lung capacity.

3. **FEV1/FVC RATIO**- ratio of forced expiratory volume of air expired during first second of FVC to forced vital capacity expressed as percentage.

III. Observation & Results

Table1. Distribution and comparison of pulmonary function test parameters between bronchial asthma patients and healthy subjects.

PFT PARAMETERS	HEALTHY(CONTROL)	BRONCHIAL ASTHMA PATIENTS (CASES)	
	Mean(S.D.)	**Mean(S.D.)**	**P-Value**
FEV1	2.37(0.57)	1.23(0.72)	0.001
FVC	2.59(0.63)	1.71(0.78)	0.001
FEV1/FVC RATIO	91.76(4.62)	69.37(18.16)	0.001

P value< 0.05 is statistically significant.

P value <0.001 is statistically highly significant.

All pulmonary function test parameters FEV1, FVC, FEV1/FVC RATIO reduced in bronchial asthma patients as compared to healthy subjects and the difference is statistically highly significant as indicated by p value.

Figure1. Bar diagram showing comparison in Pulmonary function test parameters between control and cases.

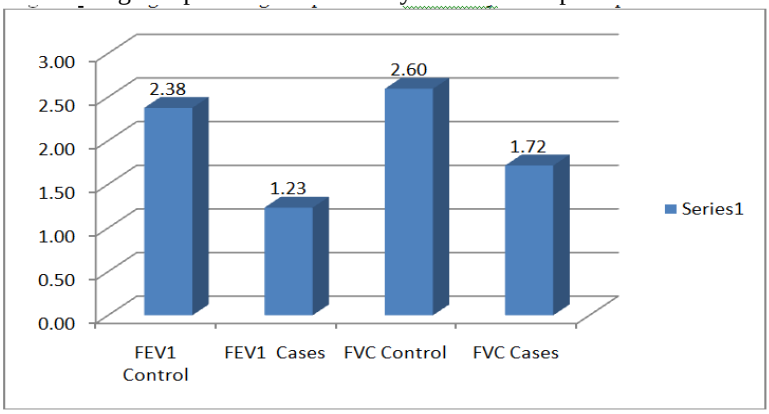
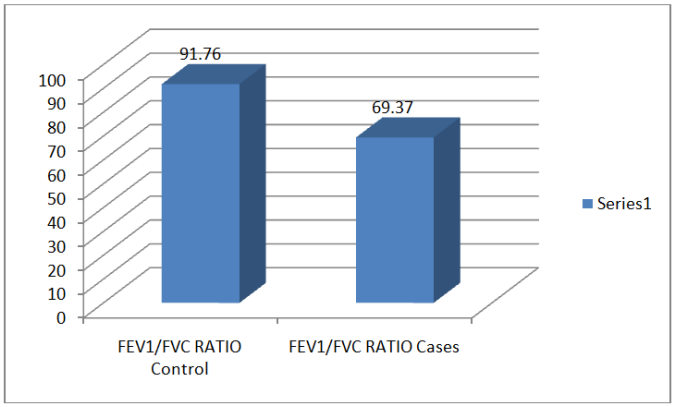


Figure2. Comparison of FEV1/FVC RATIO between control & cases



IV. Discussion

Findings of the present study have shown that there is decline in the lung function in asthmatic patients as compared to control group. The difference in all lung function parameters in patients and control subjects are statistically significant. Present findings are thus in line with the perception that asthma is a chronic inflammatory disease in which ongoing tissue injury and repair may result in irreversible fibrotic changes in the airways leading to decline in lung functions. The results of previous studies of the decline in FEV1 in people with asthma are generally consistent with the present findings *Fletcher and co-workers (1976)* mean unadjusted decline in FEV1 of 22ml. per year greater in men asthma than in men without asthma. More recent studies have evaluated FEV1 decline in large population samples *(Ulrik et al, 1992 and Lange et al, 1998)* and the result suggest that asthma as a significant impact on lung function decline. However in the Tucson lung study *(Burrows et al,1987)* declines in FEV1 of less than 5ml.per year were observed in adults with asthma. In a recent report of 25-year follow -up data on adults from a Dutch asthma clinic , more than 75 percent of the patients had FEV1 values below 90 percent of the predicted values at the final examination*(Panhuysen et al,1997).* In a study by *Zeiger et al (1999),* the unadjusted annual decline was 80.1 ml. per year for asthma duration for FEV1 and 20.5 ml. per year for FVC in the whole study group. Also *Peat et al (1987)* found a mean loss of FEV1 in male non-smokers suffering from asthma of about 50 ml. year compared with 35ml./year in normal subjects. *Silverstein et al (1994) Lange et al(1996) Huovinen et al (1997*) show that a reduction in ventilator function leads to an increased mortality among asthmatic subjects . The preservation of normal lung function should be one of the aims of asthma therapy. Furthermore, in the present study findings, it is seen that smoking in asthma patients increases the severity and accelerates the decline in lung function. *Thomson and Spears (2005)* have reported that smoking and asthma are associated with poor symptom control and impaired therapeutic responses to antiasthma drugs.

Higher levels of smoking are seen in patients with asthma who attend emergency departments with exacerbations *(Silverman et al, 2003)* compared with asthmatic non-smokers , smokers with asthma have worse symptom control *(Althuis et al, 1999),* an accelerated decline in lung function *(Lange et al, 1998)* and increased mortality rate (*Marquette et al, 1992). (Gallefos and Bakke, 2003)* Asthmatic smokers have more severe asthmatic symptoms , greater need for rescue medications, and worse indices of health status in comparison with asthmatics who have never smoked. Therefore it is clearly evident from present finding that asthma patients show lower values of all lung functions.

References

[1]. Althuis, M., Sexton, M. and Prybylski, D. 1999. Cigarette smoking and asthma symptom severity among adult asthmatics. J Asthma, 36: 257-64.

[2]. Bai, T. R., Vonk, J . M., Postma, D. S. and Boezen, H.M. 2007. Severe exacerbations predict excess lung function decline in asthma. Eur. Respir. J., 30: 452– 456.

[3]. Burrows, B., Bloom, J.W. and Traver, G.A. 1987. Course and prognosis of different forms of chronic airways obstruction in a sample from the general population. N. Engl. J. Med., 317: 1309-131.

[4]. Cibella, F., Cuttitta ,G., Bellia, V., Bucchieri, S., D"Anna, S. Guerrera, D. and G. 2002.Lung Function Decline in Bronchial Asthma. Chest, 122 (6): 1944-1948.

[5]. Covar, RA., Spahn, J.D.,Murphy, J.R. and Szefler, S. J. 2004. Progression of asthma measured by lung function in the childhood asthma management program. Am. J. Respir. Crit. Care. Med., 170: 234–241.

[6]. Fletcher, C., Peto, R., Tinker, F.E.1976. The natural history of chronic bronchitis and emphysema; an eight year study of early chronic obstructive lung disease in working men in London.Oxford,England; Oxford University Press.

[7]. Gallefoss, F. and Bakke, P.S. 2003. Does smoking affect the outcome of patient education and self management in asthmatics? Pat. Educ. Couns., 49: 91-97.

[8]. Huovinen, E., Kaprio, J., Vesterinen, E. and Koskenvuo, M. 1997. Mortality of adults with asthma: A prospective cohort study. Thorax, 52: 49–54.

[9]. Lange, P., Ulrik, C.S. and Vestbo, J. 1996. Mortality in adults with self-reported asthma. Lancet, 347: 1285–1289.

[10]. Lange, P., Parner, J., Vestbo, J., Schnohr, P. and Jensen, G. 1998. A 15-year follow-up study of ventilator function in adults with Spirometric Evaluation of Pulmonary Function Tests in Bronchial Asthma Patients - Madan et alasthma. N. Engl. J. Med., **339:** 1194–1200.

[11]. Lee, J.H., Haselkorn, T., Borish, L., Rasouliyan, L., Chipps, B.E. and Wenzel, S.E. 2007. Risk factors associated with persistent airflow limitation in severe or difficult-to- treat asthma: insights from the TENOR study. Chest , **132:** 1882–1889.

[12]. Marquette, C.H., Saulnier, F., Leroy, O., Wallaert, B., Chopin, C., Demarcq, J.M., Durocher, A. and Tonnel, A.B. 1992. Long-term prognosis of near- fatal asthma. A 6-year follow-up study of 145 asthmatic patients who underwent mechanical ventilation for a near-fatal attack of asthma. Am. Rev. Respir. Dis., **146:** 76-81.

[13]. Panhuysen, C.I.M., Vonk, J.M. and Koëter, G.H. 1997. Adult patients may outgrow their asthma: a 25 year follow-up study. Am. J. Resp. Crit. Care Med., **55:** 1267-1272

[14]. Pascual, R.M. and Peters, S.P.2005. Airway remodeling contributes to the progressive loss of lung function in asthma: An overview. J. Allergy Clin. Immun. **116(3):** 477-486

[15]. Peat, I.K., Woolcock, A.J., and Cullen, H. 1987. Rate of decline of lung function in subjects with asthma. Eur.J .Resp. Dis. **70:** 171-179.

[16]. Sears, M.R., Greene, J.M. and Willan, A.R. 2003. A longitudinal, population based, cohort study of child hood asthma followed to adulthood. N. Engl. J. Med. **349:** 1414–1422

[17]. Silverman, R.A., Boudreaux, E.D., Woodruff, P.G., Clark, S. and Camargo, C.A. 2003. Cigarette smoking among asthmatic adults presenting to 64 emergency departments. Chest, **123:** 1472-9.

[18]. Silverstein, M.D., Reed, C.E., O"Connell, F.J., Melton, L.J., O"Fallon, W.M. and Yunginger, J.W. 1994. Long term survival of a cohort of community residents with asthma. N. Engl. J. Med. **331:** 1537–1541.
[19]. Thomson, N.C. and Spears, M. 2005. The influence of smoking on the treatment response in patients with asthma. Curr. Opin. Allergy Clin. Immunol., **5:** 57-63.
[20]. Turner, M.O., Noertjojo, K., Vedal, S., Bai, T., Crump, S. and Fitzgerald, J.M. 1998. Risk factors for near fatal asthma: a case-control study in hospitalized patients with asthma. Am. J. Resp. Crit. Care Med., **157:** 1804-9.
[21]. Ulrik, C.S., Backer, V. and Dirksen, A. 1992. Mortality and decline in lung function in 213 adults with bronchial asthma: a ten-year follow up. J. Asthma, **29:** 29-38.
[22]. Ulrik, C.S., Backer, V. and Dirksen, A. 1992. A 10 year follow up of 180 adults with bronchial asthma: factors important for the decline in lung function. Thorax, **47:** 14-18.
[23]. Zeiger, R.S., Dawson, C. and Weiss, S. 1999. Relationships between duration of asthma and asthma severity among children in the Childhood Asthma Management Program (CAMP). J. Allergy Clin. Immunol.,103:376-387.