ORIGINAL ARTICLE

EFFECT OF POST INSPIRATORY PAUSE ON FORCED EXPIRATORY VITAL CAPACITY MANEUVER

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ABSTRACT

Background: Spirometry is a very useful test in respiratory system evaluation. Maneuvers with no breathhold were associated with greater PEF values in healthy volunteers. But there is very limited data regarding the effect of post inspiratory pause on FEV, FEV_1 and FEF 25-75.

Objective: To study the effect of post inspiratory pause on FEV, FEV_1 and FEF 25-75.

Methods: This prospective study was carried out in the Department of Respiratory Medicine, Smt. B. K. Shah Medical Institute & Research Centre, Vadodara, Gujarat from January 2010 to March 2010. The subjects were tested in two sessions, approximately 30 minute apart. In first session FVC maneuver done without any pause and in second session it was done with post inspiratory pause for six seconds.

Results: Values of FVC, FEV_1 and FEF 25-75 were little higher in maneuver without post inspiratory pause as compared to maneuver with post inspiratory pause.

Conclusion: There is no statistically difference in values of all parameter amongst both the maneuvers i.e. with and without post inspiratory pause.

Key words: spirometry, post inspiratory pause, FVC, FEV_1, PFT

INTRODUCTION

Spirometry is a very useful test in respiratory system evaluation. Forced expiratory vital capacity (FVC) maneuver is the most commonly performed test. Apart from FVC two other most common measurements made from FVC maneuver; forced expiratory volume in 1 second (FEV_1) and the average forced expiratory flow rate over middle 50% of the FVC (FEF 25-75), are very important.[1] Spirometry is recommended for the diagnosis, assessing the severity and monitoring the very common respiratory diseases such as asthma and chronic obstructive pulmonary diseases (COPD). It is also recommended in smokers and peoples exposed to environmental and occupational pollutants. It is also useful in evaluation of patients with dyspnoea, unexplained cough, chest radiographs with diffuse interstitial or alveolar pattern and in pre operative screening.[1]

Standardisation of technique is paramount to produce reproducible measurements of FVC, FEV_1 and FEF 25-75. In several previous studies, fast inspiratory maneuvers with no breathhold were associated with greater PEF values in healthy vounteers[2, 3] as well as patients with asthma. [3] To the best of authors knowledge there is very limited data regarding the effect of post inspiratory pause on FEV, FEV_1 and FEF 25-75.

METHODS

This prospective study was carried out in the Department of Respiratory Medicine, Smt. B. K. Shah Medical Institute & Research Centre, Vadodara, Gujarat from January 2010 to March 2010. The research was approved by the institutional ethics committee and informed consent was obtained from all of the subjects. Total 11 healthy volunteer medical students of both sexes were included in this study. All volunteers were underwent detailed clinical history and thorough clinical examination. All were subjected to the ATS questionnaire of respiratory diseases. Students who were non-smokers, had no history of asthma, cough, or recent respiratory infection and were not taking medication; were included in the study.

The subjects were tested in two sessions, approximately 30 minute apart. In first session FVC maneuver done without any pause (NP maneuver) and in second session it was done with post inspiratory pause for six seconds (P maneuver). FVC maneuver was done according to American Thoracic Society and European

Respiratory Society guideline.[4] Spirometry was done by spiro2000 spirometer (Finland). Calibartion was done on each day morning prior to starting tests. In NP maneuver subjects inhaled rapidly to total lung capacity (TLC) and immediately performed forced expiration, whereas in P maneuver subjects inhaled rapidly to TLC and after a pause of 6 seconds performed the forceful expirations.

RESULTS

Table 1 shows the values of FVC, FEV_1 and FEF 25-75 in two different maneuvers. Small differences were noticed with pause and without pause in all parameters (FVC, FEV_1 and FEF 25-75). Values of all parameters were higher in NP maneuver. However, none of the difference was statistically significant implying that NP maneuver give any significant affect on the outcome of spirometric measurements.

Table 1: Data obtained by two maneuvers

Variable	P maneuver (Mean ± SD)	NP maneuver (Mean ± SD)	% of improvement in NP as compare to P maneuver	P value
FVC	4.41 ± 1.09	4.55 ± 1.01	3%	Non significant
FEV_1	3.77 ± 0.87	3.95 ± 0.78	5%	Non significant
FEF 25-75	4.17 ± 1.16	4.51 ± 1.08	8%	Non significant

DISCUSSION

The two maneuvers differed only in the post inspiratory pause in P maneuver. A study[5] in healthy volunteers found that maneuvers with a post inspiratory pause of two seconds at TLC decreased PEF by about 10% when compared with maneuvers without a pause. It has been found that forceful inspirations that were immediately followed by forced expirations produced greater increases in the expiratory pressures (by approximately 10 to 15%) when compared with maneuvers characterized by slow inspirations and post inspiratory pauses at TLC. The length of postinspiratory pause may neutralize the inspiratory maneuver effects on PEF. A breathhold at TLC allows stress relaxation in both the airway wall and lung parenchyma to occur and, thus, increases the airway compliance and decreases the effective elastic recoil pressure. In certain patients with cystic fibrosis[6] the differences in PEF and other spirometric parameters were much greater, probably reflecting the lung viscoelastic properties of these patients.

But in our study and study done by Omar[7] et al, there was no statistically significant difference in different spirometric parameters in healthy subjects. In view of these findings it emphasized the need of more data to standardize the FVC maneuver.

CONCLUSION

FVC maneuver with post inspiratory pause decreases the value of all parameters but it is statistically non significant.

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