

PEAK EXPIRATORY FLOW RATE IN CIGARETTE SMOKERS

By

Dr C.O. Ukoli, Dept. of Medicine, Jos University Teaching Hospital, Jos.

Dr D.E ; Joseph, Dept of Haematology Jos University Teaching, Jos.

Prof.M. A. Durosinmi Dept of Haematology. Obafemi Awolowo University Teaching Hospital, Ile-Ife.

Correspondence to Dr C.O Ukoli.

ABSTRACT

Objective: To compare lung function between smokers and non-smokers using Peak Expiratory Flow Rate (PEFR).

Methods: This study examines the peak expiratory flow rate (PEFR) of three hundred and forty cigarette smokers, age and sex-matched with PEFR of equal number of non smokers.

Result: The mean PEFR of all the smokers (males and female) was 225.0 ± 62.79 L/min as against that of non-smokers which was 301 ± 84.68 L/min. ($P < 0.05$). The PEFR of smokers was found to be significantly lower than that of non-smokers suggesting that lung function is significantly reduce in smokers. Duration of smoking of 24 months or more was the main factor that affected their PEFR.

Conclusion: Long duration of smoking is associated with significant reduction in lung function. This can be detected with this simple but reliable test of PEFR even in rural clinics.

KEY WORDS

PEAK EXPIRATORY FLOW RATE ,CIGARETTE SMOKERS .

INTRODUCTION

Unadulterated (pure) tobacco is said to contain over 2500 identified constituents (1). The most noxious of constituents are tar, carbon monoxide and nicotine (2) It has been though that nicotine (and perhaps its metabolite nicotine) may be reinforcing agent for tobacco dependence(3).prolonged exposure to cotton hem or flax dust causing byssinosis are known to increase the risk of developing obstructive lung disease in cigarette smoker

Compared to Non-smokers. The inhalation of tobacco o smoke is known to cause an immediate rise in the air way resistance which persists for at least an hour; this is said to be due to a reflex response to the deposition of particle upon the epithelial lining of the larynx the trachea and the larger bronchi and is not specific to tobacco smoke⁴.From cross section studies it was found that the impairment of lung function in smoker is related to the daily consumption of the tobacco, the period of smoking whether or not the subject inhales and the extent to which smoking predisposes the subject to coughing to phlegm production from the chest (phlegm producing smokers tend to have more airway resistance than non flame producing smokers⁴

The peak expiratory flow rate (PEFR)in litres per second is defined as maximum that can sustain for ten millisecond⁴ and it is known that PEFR gives indication of lung function⁴

Methods: The peak expiratory flow rate (PEFR) of three hundred and forty chronic smokers (smoking one stick of cigarette per day for a maximum of six months)⁵ and PEFR of equal number of non- smokers seen in the Jos university Teaching Hospital. Expiratory flow rates were measured using the mini-standard peak flow metre . Clearance was obtained from the hospital ethical committee.

all the subjects were measured in sitting position. The best of three readings was recorded in litres per minute. PEFR of smokers were measured at least one hour after the last cigarette smoked to avoid or minimize the rise in airway resistance which immediately follows tobacco inhalation. Subjects with persistent cough from any cause, those who were only living with smokers within 6 months preceding the study, those involved in mining industry or cafeteria services, those who used tobacco in another form other than smoking, occasional smokers, pregnant females, those on any form of medication and those who smoke other things (e.g. Indian hem) other than cigarettes were excluded from the study. Only consenting subjects were included. With the Epi-info computer software version 6 (WHO and CDC 1997), analysis of variance (ANOVA), was used to compare the PEFR of smokers with those of non smoker.

RESULTS

The results are as shown in tables 1, 2, and 3. Comparing the PEFR of smokers with that of non- smokers, the mean PEFR of all the smokers (males and female) was 225.0 ± 62.79 L/min as against that of non-smokers which was 301 ± 84.68L/min. The PEFR of smokers was found to be significantly lower than that of non-smokers (p<0.05) implying that lung function is significantly reduce in smokers.

Table 1: Peak Expiratory Flow Rates (PEFR) of Subjects (L/MIN)

| Subjects | Sex | Mean (L/min) | SD (L/min) | Range (L/min) | Significance |
|-----------------------|---------|--------------|------------|---------------|----------------------|
| Cigarette Smokers | M (335) | 226.1 | 62.65 | 100.8-351.4 | F= 8.52 P=0.05 |
| | F (5) | 156.0 | 16.73 | 122.5-189.5 | |
| Non Cigarette smokers | M (335) | 302.6 | 84.94 | 132.7-472.5 | F = 1.37 F = 0.24 |
| | F (5) | 258.9 | 54.04 | 149.9-366.1 | |

SD = Standard Deviation
M= Male
F = Female
Range = Mean ± 2 SD

Table 2: Peak Expiratory Flow Rates of Smokers compared with those non smokers

| Subject | PEFR (L/Min) | Significance |
|-------------------|--------------------------------|------------------------|
| Smokers (340) | 225.0 ± 62.79 (99.4-350.6) | F = 180.92 P = 0.00 |
| Non-Smokers (340) | 301.9 ± 84.68 (132.5-471.3) | |

Table 3: Duration of Cigarette smoking and PEFR of Smokers

| Duration of smoking | Mean PEFR ± SD (L/min) | Significance |
|--------------------------------|------------------------|-------------------|
| 6 months- 12 months n=81 | 216.9 ± 58.04 | F=3.03 P< 0.05 |
| 13 months- 60 months n= 118 | 236.3 ± 68.68 | |
| > 60 months n=141 | 220.2 ± 59.24 | |

DISCUSSION

The range of peak expiratory flow rate (PEFR) values obtained among the male cigarette smokers (100.8-351.4L/min, table1) is lower than the generally accepted normal range for non- smoking males ,360-900L/min (4) even though the body size of the smokers were not considered in study. However the range for the female smokers (122.5-189.5L/min table 1) falls within the Accepted normal range for non- smoking female (168-606L/min)(4).

Suggesting that lung function impairment is worst in male smokers than in non smoking females. This observation may be due to the fact that males are more likely to have smoked more than their female counterpart since the quantity of cigarette was found to affect lung function adversely.

How ever comparing the smokers with non smokers, the lung function non- smokers are better than that of smokers (p<0.05) (table2). Duration of smoking was found to be the sole factor responsible for the lung function impairment (table 2). The degree of smoke inhalation (partial or complete heaviness of cigarette smoking (number of sticks per day) and the type of cigarette smoked did not significantly affect the lung function in smokers.

Many of our rural clinics in developing countries do not have sophisticated equipment to assess the lung function status of smokers. But simple test (PEFR) of lung function in our subject is cheap easy to carry out and it is realizable if well supervised. In order to assist in the tobacco smoking control strategies of the World Health Organisation, measurement of PEFR of cigarette smokers should routinely check their PEFR. Where there is an evidence of impairment, the subject should be advised by the health worker to stop smoking.

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