

## SHORT\* COMMUNICATION

### A COMPARISON OF PEAK EXPIRATORY FLOW RATES OBTAINED WITH THE MORGAN SPIROCHECK AND A MINI PEAK FLOW METER

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**Abstract :** To examine whether the normal Indian standards of Peak Expiratory Flow Rate (PEF) established with the peak flow meter were applicable to PEF values obtained with the Morgan Spirocheck, a comparison was made of PEF(S) measured with the Spirocheck with PEF (M) obtained with a Mini Peak Flow Meter. Data were obtained in 92 subjects (53 males between 20 and 84 years of age and 39 females between 21 and 75 years), comprising staff of the institute, patients undergoing treatment for chronic arthritis, and the accompanying relatives. There was a highly significant correlation between the two values. The values were identical in 14 subjects; the differences between the values were within 10% in 54 subjects, and in excess of 10% in only 20 subjects. In the whole group, the mean and standard error were  $363.5 \pm 14.7$  and  $384 \pm 15.2$  lit/min for PEF (S) and PEF (M) respectively. The regression equation  $PEF (M) = 0.961 \times PEF (S) + 34.9$  will enable estimation of expected value of PEF (M) corresponding to the observed value of PEF (S) when a standard obtained with a Peak Flow Meter is used to assess abnormality in a patient.

**Key words :** peak expiratory flow rate  
peak flow meter

Morgan spirometry

#### INTRODUCTION

Peak Expiratory Flow Rate (PEF) is the maximum rate of air flow achieved during a forced expiration following a maximal inspiration. It is the simplest ventilatory function test, and is useful for following the progress of chronic obstructive airway disease, and especially for monitoring the course of bronchial asthma. It is usually measured with a Wright Peak Flow Meter (PFM) devised in 1959 by Wright and Mckerrow (1), and more recently with its modification, the Mini Peak Flow Meter. Almost all western and Indian norms are based on data obtained with the Peak Flow Meter (2-6). In this institute, in which patients with chronic arthritis, spondylosis, chronic ulcers, bronchial asthma

and other chronic diseases are treated with Pulsed Magnetic Fields of very low frequency and intensity, with beneficial results, PEF is measured with the Morgan Spirocheck. It has been shown that PEF obtained with a PFM differs from the values with pneumotachograph or a spirometer (7). Hence this study was undertaken to examine whether the Indian standards based on data from the PFM can be applied to the values got from the Spirocheck.

#### METHODS

The two instruments used for this comparative study were (i) the Morgan Spirocheck which is an imported, battery operated portable instrument, which gives a digital display of PEF, as well as the Forced

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Vital Capacity and the Forced Expiratory Volume in one second (ii) a mini Peak Flow Meter (Breath Med) which is indigenously made and is a small tubular instrument which requires neither electric power nor a battery. It has an indication which moves along a scale calibrated in litres per min from 60 to 800 lit/min. Readings are taken after a forced breathing following a maximal inspiration.

Measurements were made in 92 subjects, of whom 53 were men between 20 and 84 years of age (mean and standard deviation  $48.5 \pm 16.2$ ) and 39 women between the ages of 21 and 75 years ( $48.1 \pm 15.5$ ). The subjects comprised the staff of the institute, patients undergoing treatment for chronic arthritis, and relatives accompanying the patients. Each subject performed the manoeuvre three times with each instrument and the highest value accepted as the PEF. The data were statistically analysed.

## RESULTS AND DISCUSSION

The mean values with standard error(SE) for each group and the whole group are shown in the Table. The values of PEF(S) and PEF(M) i.e., with the Spirocheck and PFM and identical in 14 subjects (8 men and 6 women). In 54 subjects (32 men and 22 women) the differences were within 10% and statistically not significant. In 24 subjects (13 men and 11 women) the differences were in excess of 10% and statistically significant. However, in the whole group the mean difference was only about 6% and not significant.

The Spirocheck values were generally lower than the Peak Flow Meter readings. In the group in which the differences were within 10%, the PEF(M) was higher by a percent mean and standard deviation of  $5.0\% \pm 2.6$  in 25 men and  $7.6\% \pm 2.5$  in 14 women. In 7 men

TABLE I : Showing comparative data of Peak Expiratory Flow Rates.

Category	Number	PEF(S)		PEF(M) in lit/min	
		Mean	SE	Mean	SE
<i>Values identical</i>					
Males	8	350.0	32.6	350.0	32.6
Females	6	329.2	22.4	329.2	22.4
Total	14	341.1	20.5	341.1	20.5
<i>Difference upto 10%</i>					
Males	32	476.3	22.5	483.7	24.9
Females	22	278.9	15.5	288.9	15.5
Total	54	395.9	19.6	404.4	20.5
<i>Difference in excess of 10%</i>					
Males	13	334.2	28.4	398.7	31.1
Females	11	270.9	20.0	323.6	19.6
Total	24	305.2	18.9	364.4	20.3
<i>Whole group</i>					
Males	53	422.4	18.9	442.7	18.8
Females	39	284.4	11.1	305.4	11.2
Total	92	363.5	14.7	384.4	15.2

(S) is Spirocheck, (M) is Peak Flow Meter and SE is Standard Error

and 8 women the PEF(S) was higher by  $4.5\% \pm 2.3$  and  $4.7\% \pm 2.1$  respectively. In the group in which the differences were in excess of 10%, only one male and one female subject had a higher PEF(S), by 18.8% and 14.3% respectively. In the remaining 12 men and 10 women the PEF(M) was higher by  $24.7\% \pm 12.1$  and  $25.7\% \pm 13.4$  respectively.

The correlation between the PEF(S) and PEF(M) was highly significant in all the groups, the correlation coefficients being 0.954 in the within 10% difference group, 0.878 in the group in which the difference was in excess of 10%, and 0.93 for the whole group. The regression equation derived for the whole group was,  $PEF(M) = 0.961 \times PEF(S) + 34.9$ , with a standard error of estimate of 53.0 litres. With this prediction formula, the PEF(S) of 200,

300, 400, 500 and 600 lit/min correspond to PEF(M) values of 227, 323, 419, 515 and 611 lit/min respectively. Hence it is adequate if 27 to 23 is added to PEF(S) values between 200 and 300, 21 to 17 to values between 350 and 450, and 15 to 11 for value between 500 and 600, when a Spirocheck value is compared with an expected value obtained with a prediction formula based on the Peak Flow Meter data, for evaluating patients for pulmonary impairment.

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