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LETTER TO THE EDITOR

INCENTIVE SPIROMETRY AND PEFR IN DIFFERENT PHASES OF PREGNANCY

Sir,

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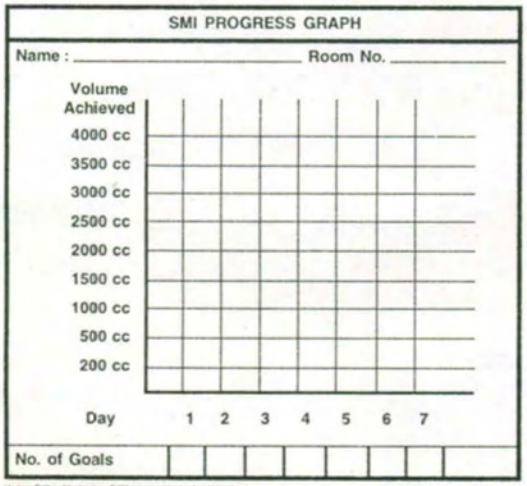
Incentive spirometry is a goal-oriented technique for improving and assessing the Inspiration capability of the lungs by preventing small airway collapse. It is routinely in patients undergoing Cardio-Thoracic surgery. Though it is not a part of routine Pulmonary Function Tests, we wanted to apply the technique to measure the Inspired Volume of Air by Sustained Maximal Inspiration (SMI) during the different trimesters of pregnancy.

Incentive spirometry was performed by Sustained Maximal Inspiration, using the Hudson's Incentive Spirometer (Hudson Respiratory Care Inc., California, USA; Cat. No. 1750). The instrument consists of a hollow plastic cylinder containing a red plastic ball within it. The ball is arranged such that it rises and floats in air within the cylinder, during the act of inspiration. There is an adjustable knob on the top of the cylinder which regulates the rate of inspiratory flow of air. The cylinder is connected to a mouthpiece through a latex free plastic tube. The technique of Sustained maximal Inspiration is performed by inspiring at a slow yet sufficient rate to raise the ball in the spirometer.



A total of 70 healthy pregnant women were randomly taken from the antenatal clinic as subjects for the study. After demonstrating the technique of Sustained Maximal Inspiration (SMI) to each subject, she was asked to place the mouth-piece in her mouth and from a normal resting position, inspire at a slow yet sufficient rate such that the ball in the spirometer is raised. Close watch was made to ensure that a tight seal was maintained between lips and the mouthpiece of the device. The time for which the ball was kept in air was recorded as the Inspiratory time. The subject was asked to repeat the procedure 3 times in upright (sitting) position and the best of the 3 values were taken. The Inspired Volume was calculated by multiplying the Inspiratory time (in secs) by the Inspiratory Flow Rate setting of the Spirometer (in cc/sec). The individual's Age, Height, Chest Expansion were noted. PEFR was recorded using FERRARIS Pocket Peakflow meter (1).

Observations and calculations

Table I presents the data observed in the different trimesters of pregnancy.

Observations

(1) When the 'p' values of the different parameters were calculated (refer Table II), it was found that there is a significant decrease in PEFR in the second trimester (p=0.02), but in the third trimester, the PEFR does not change significantly. This agrees with the observations of previous studies. (2, 3, 4).

(2) There is no significant change in Inspired Vol by SMI technique during the different trimesters. Pregnancy may hinder inspiration by decreasing the chest expansion but progesterone increases the force of Inspiration and compensates it so that the inspiratory volume is unchanged (5, 6).

(3) There is a gradual decrease in chest expansion during pregnancy, but the change is not significant when values are compared for I and II trimesters or II and III trimesters. The change becomes significant only if we compare the values of I trimester with the III trimester. This change may be due to the restriction of diaphragmatic movement due to the expanding uterus (7).

TABLE I

	First Trimester			*Second Trimester*			*Third Trimester*		
	n	*Mean*	*SD*	*n*	*Mean*	*SD*	*n*	*Mean*	*SD*
Ht. cm	21	1.55 cm	0.05	24	1.55	0.05	25	1.55	0.02
PEFR cc/sec	"	359.5	38.91	"	326.66	54.46	"	326.0	53.9
Inspd Vol cc	"	1161.9	215.58	"	1183.33	343.46	"	1120.0	326.5
Chest Exp.	"	2.8 cm	.07	"	2.66	0.76	"	2.36	0.56
BMI	"	22.8	4.87	"	22.28	4.77	"	22.87	3.78

TABLE II

Parameter	'P' values		
	I vs II trimester	*II vs III trimester*	*I vs III trimester*
PEFR	0.023	0.966	0.018
Insp Vol	0.800	0.511	0.605
Chest Exp	0.370	0.120	0.006

(4) It has also been observed that there is no correlation of PEFR of Insp Vol by SMI with Height, BMI or chest expansion. This observation does not agree with the findings of other studies (4, 8) and may be due to the small size of the sample.

(5) Another interesting finding that has been observed in I and II trimesters is that the Chest expansion is negatively correlated with the Inspired volume as shown by the negative 'r' values in Table III. We are unable to explain this negative correlation.

TABLE III : 'r' Values.

		PEFR	*Inspired Vol*
I Trimester	Ht.	0.14	–0.4
	BMI	0.29	0.11
	Chest Exp	0.04	–0.54
II Trimester	Ht.	–0.08	0.11
	BMI	0.47	0.35
	Chest Exp	0.36	–0.48
III Trimester	Ht.	0.32	–0.02
	BMI	0.40	0.24
	Chest Exp	–0.19	–.0.01

Further studies are required in this connection.

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