

TO OBSERVE THE CHANGES IN VENTILATORY FUNCTIONS DURING DIFFERENT PHASES OF THE MENSTRUAL CYCLE IN FEMALES OF 17 TO 21 YEARS OF AGE

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Abstract:

Background: This study was carried out to see the effects of height, weight, age sex, body surface area and different phases of menstrual cycle (in females) on Ventilatory Functions in young adults of both sexes of 17-22 years of age at Amaltas Institute of Medical Sciences, Dewas, (M.P.).

In female subjects most Lung Function values were higher in their luteal phase in comparison with follicular phase. Difference in FEV_{1.5}, PEFR, FEF25% and MVV were statistically significant.

Keywords: Ventilatory, Mestrual, Female

Introduction

Nowadays Pulmonary Function Tests are being included in routine Pre Anaesthetic Examinations. Thus they are being proved very useful for anesthetists. These tests are of a great value and importance in assessment of claims in the industrial disabilities and legal proceedings.

Pulmonary Functions consist of three processes - Ventilation, Diffusion and Perfusion. These are intimately linked in health but the diseased condition may affect any of them alone or together. Ventilation is the most commonly affected process of Lung Functions in clinical practice. Compared to the inadequacy of ventilation, the disturbance of gas exchange occurs far less frequently. Tests of ventilation are also simpler and used extensively. Hence study of ventilation is of great practical importance.

The normal reproductive years of the female are characterized by monthly rhythmical changes in the rates of secretion of the female hormones and corresponding physical changes in the ovaries and other sex organs. This rhythmical pattern is called the female monthly sexual cycle (or, less accurately, the

menstrual cycle). The duration of the cycle averages 28 days and for 3-5 days actual bleeding occurs. Menstrual cycle occurs in three phases: Menstrual, proliferative and secretory phase, which are regulated by sex hormones: estrogen, progesterone secreted from the ovary and also by gonadotropins: Luteinizing and follicle stimulating hormones secreted from anterior pituitary. Endogenous hormone levels vary around puberty and in menarche, menstrual phases, menstrual irregularity, lactation, during proximity to menopause etc.

Material & Method

The present study was conducted on 185 young adults from 17 to 22 years of age. Healthy females, at Amaltas Institute of Medical Sciences, Dewas, (M.P.).

Selection of subjects:

The subjects selected for the study were normal healthy young adults with no history of any disease, which could influence Pulmonary Function. They were carefully examined clinically for all the systems with special emphasis on respiratory system. Such subjects who gave present or past history of any such illness were excluded from the study. Subjects with extreme anthropometrics values (ie. very obese or

underweight or very tall students) were also excluded from the study. In female subjects only those were included, who had normal regular menstrual cycles i.e. of 28 ± 4 days for at least last two consecutive cycles. Subjects with irregular cycles or who have cycles longer than 32 days or shorter than 24 days were excluded from the study. Girls who were undergoing hormonal treatment for something or other, were also not taken into the study.

Statistical Analysis:

All the data thus obtained was analyzed on SPSS software. Mean values alongwith Standard Deviation of 95% for all the parameters were calculated. t-values and p-values were calculated manually to see the significance of difference in two groups.

Results

Table 1: Mean values of Lung Function parameters in Females according to their Age.

Age (yrs)	No. of subjects	PEFR (ltrs/sec)	FEF ₂₅₋₇₅ (ltrs/sec)	FEF _{25%} (ltrs/sec)	FEF _{50%} (ltrs/sec)	FEF _{75%} (ltrs/sec)
17	09	4.21±1.46	2.80±0.75	3.92±1.28	3.18±0.86	1.84±0.66
18	31	4.75±1.43	3.17±0.75	4.50±1.34	3.57±0.91	1.99±0.50
19	25	5.30±1.07	3.11±0.67	4.91±0.99	3.51±0.86	1.99±0.58
20	15	5.19±1.27	2.99±0.76	4.68±1.18	3.38±0.87	1.79±0.62
21	01	2.80	2.31	2.70	2.80	1.46

Table 01 shows the mean values of Lung Functions (flow rates) in female subjects arranged according to their age.

- In 17 year age group there are 09 subjects. They are having the mean values for PEFR, FEF₂₅₋₇₅, FEF_{25%}, FEF_{50%} and FEF_{75%} of 4.21 ± 1.46 , 2.80 ± 0.75 , 3.92 ± 1.28 , 3.18 ± 0.86 , and 1.84 ± 0.66 , litres/sec. respectively.
- In 18 year age group the number of subjects are 31. Their mean values of PEFR, FEF₂₅₋₇₅, FEF_{25%}, FEF_{50%} and FEF_{75%} are 4.75 ± 1.43 , 3.17 ± 0.75 , 4.50 ± 1.34 , 3.57 ± 0.91 , and 1.99 ± 0.50 , litres/sec. respectively.
- In 19 year age group there are 25 female subjects. For this group the mean values for PEFR,

FEF₂₅₋₇₅, FEF_{25%}, FEF_{50%} and FEF_{75%} are 5.30 ± 1.07 , 3.11 ± 0.67 , 4.91 ± 0.99 , 3.51 ± 0.86 , and 1.99 ± 0.58 , litres/sec. respectively

- In 20 year age group the number of subjects are 15. Their mean values for PEFR, FEF₂₅₋₇₅, FEF_{25%}, FEF_{50%} and FEF_{75%} are 5.19 ± 1.27 , 2.99 ± 0.76 , 4.68 ± 1.18 , 3.38 ± 0.87 , and 1.79 ± 0.62 , litres/sec. respectively.
- In 21 year age group there is only 01 female. Her mean values for PEFR, FEF₂₅₋₇₅, FEF_{25%}, FEF_{50%} and FEF_{75%} are 2.80, 2.31, 2.70, 2.80 and 1.46 litres/sec. respectively.
- In short flow rates are not exhibiting any regular pattern in different age groups between 17 and 21 years of age.

Table 2: Lung Function in Follicular and Luteal Phases of Menstrual Cycle (n = 64)

	Follicular Phases	Luteal Phases	t-value	p-value
FVC (ltrs)	2.29 ± 0.35	2.39 ± 0.34	1.73	>0.05 (NS)
FEV _{0.5} (ltrs)	1.75 ± 0.27	1.85 ± 0.26	2.13	<0.05 (S)
FEV ₁ (ltrs)	2.20 ± 0.32	2.31 ± 0.31	1.96	>0.05 (NS)
PEFR (ltrs/sec)	5.00 ± 1.25	5.59 ± 1.05	2.87	<0.05 (S)
FEF ₂₅₋₇₅ (ltrs/sec)	3.08 ± 0.69	3.20 ± 0.69	0.98	>0.05 (NS)
FEF _{25%} (ltrs/sec)	4.60 ± 1.19	5.02 ± 1.02	2.13	<0.05 (S)
FEF _{50%} (ltrs/sec)	3.50 ± 0.81	3.63 ± 0.86	0.87	>0.05 (NS)
FEF _{75%} (ltrs/sec)	1.92 ± 0.54	1.87 ± 0.51	0.53	>0.05 (NS)
FEV _{0.5} /FVC%	76.51 ± 9.79	77.20 ± 8.17	0.43	>0.05 (NS)
FEV ₁ /FVC%	95.95 ± 5.65	96.26 ± 3.93	0.36	>0.05 (NS)
MVV (ltrs/min)	91.09 ± 18.70	98.33 ± 15.54	2.36	<0.05 (S)

Table - 02 shows the mean values of Lung Functions in Follicular and Luteal phases of menstrual cycle in 64 female subjects.

- Mean FVC in follicular phase is 2.29 ± 0.35 litres. In Luteal phase it is 2.39 ± 0.34 litres, t-value is 1.73 and p-value is >0.05 . Difference is non-significant.
 - Mean FEV₅ in follicular phase is 175 ± 0.27 litres. In luteal phase it is 1.85 ± 0.26 litres t-value is 2.13 and p-value is <0.05 . It shows that the difference is statistically significant.
 - Mean FEV₁ in follicular phase is 2.20 ± 0.32 litres. In luteal phase it is 2.31 ± 0.31 litres. T-value is 1.96 and p-value is >0.005 . This shows non-significant difference.
 - Mean PEFR in follicular phase is 5.00 ± 1.25 litres/sec. In luteal phase the value of PEFR is 5.59 ± 1.05 lit/sec. For this the t-value is 2.87 and p-value is <0.05 . Difference in values of PEFR in two phases is statistically significant
 - Mean FEF₂₅₋₇₅ in follicular phase is 3.08 ± 0.69 lit/sec. In luteal phase it is 3.20 ± 0.69 lit/sec. t-value is 0.91 and p-value is >0.05 . Difference is non-significant.
 - Mean FEF_{25%} in follicular phase is 4.60 ± 1.19 lit/sec. In luteal phase it is 5.02 ± 1.02 lit/sec. t-value is 2.13 and p-value is <0.05 . Difference in two phases is significant.
 - Mean FEF_{50%} in follicular phase is 3.50 ± 0.81 lit/sec. in luteal phase it is 3.63 ± 0.86 lit/sec. The difference is non-significant with t-value 0.87 and p-value >0.05 .
 - Mean FEF_{75%} in follicular phase is 1.92 ± 0.54 lit/sec. In luteal phase it is 1.87 ± 0.51 lit/sec. Values are more in follicular phase but difference is non-significant with t-value 0.53 and p-value >0.05 .
 - Mean FEV₅/FVC% in follicular phase is 76.51 ± 9.79 . In luteal phase it is 77.20 ± 8.17 . The difference is non-significant with t-value 0.43 and p-value >0.05 .
 - Mean FEV₁/FVC% in follicular phase is 95.95 ± 5.65 . In luteal phase it is 96.26 ± 3.93 . t-value is 0.36 and p-value is >0.05 showing non-significant difference.
 - Mean MVV in follicular phase is 91.09 ± 18.70 litres/min. In luteal phase it is 98.33 ± 15.54 litres/min. t-value is 2.36 and p-value is <0.05 . Difference is significant statistically.
- In short, although all Lung Function values are higher in luteal phase except FEF_{75%}, increase in FEV₅, PEFR, FEF_{25%} and MVV is statistically significant.

Discussion

The maximum ventilation which the subject can attain depends on the integrity of the whole respiratory apparatus, including the thoracic cage, the respiratory muscles with their control mechanisms and the resistance of the lung. Thus the ventilatory capacity or MVV is a good measure of the overall function of the lung, especially as it is also related to the ability to increase the ventilation during exercise. The maximum voluntary ventilation in adults, depending on their age and size, is in range 47 lit/min. to 2.59 lit/min. in males and 55 lit/min to 142 lit/min in females (Cotes J.E.,1968)⁴.

Our values are in agreement with Kuppu Rao⁵ et.al (1988), Bhargava et.al (1973)⁶ and Mahajan K.K.⁷ et.al (1997). On comparing the values obtained by Qazi et.al⁸ (2001) our values of MVV were lower. The probable reason may be the difference in anthropometric measures of the subjects, their different levels of physical activity and different machines, used in the studies.

Conclusion

In female subjects most Lung Function values were higher in their luteal phase in comparison with follicular phase. Difference in FEV₅, PEFR, FEF_{25%} and MVV were statistically significant.

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