

# The Impact of Normal Physiological Fluctuation of Progesterone Hormone on Peak Expiratory Flow Rate in Premenopausal Women in A sample of Iraqi

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## Abstract :

This study was performed to determine normal physiological fluctuation of serum progesterone Hormone on peak Expiratory Flow Rate (PEFR %). The study involved 50 healthy in follicular phase (group A) and 59 healthy premenopausal women in luteal phase (group B). PEFR % was higher in luteal phase in compared to follicular phase of premenopausal women, the relationship was significant ( $p < 0.01$ ,  $r = 0.992$ ). Serum progesterone level was higher in luteal phase in compared to follicular phase of premenopausal women ( $P < 0.05$ ). There were a significant positive correlation between PEFR % and progesterone level in group A ( $P < 0.01$ ,  $r = 0.859$ ) and group B ( $p < 0.01$ ,  $r = 0.995$ ). Therefore, the normal cyclical progesterone hormone level should be taken considerably in interpretation of PEFR %.

**Keyword:** progesterone Hormone, peak Expiratory Flow Rate, follicular phase, luteal phase

## 1. Introduction:

Peak expiratory flow rate (PEFR) is a maximum flow rate generated during a forceful exhalation, starting from full lung inflation. It primarily reflects large airway flow [1]. Peak flow meter is a useful instrument for monitoring PEFR in children and adult [2]. PEFR is a widely used lung function test and it is an effective measure of effort dependent airway. It is a relatively simple procedure, and is carried out in the field using a portable instrument [3].

The hormones, which are released by the ovaries, bring about physiological changes in the brain, musculoskeletal system, cardiovascular and pulmonary function, in addition to changes in the reproductive system. The variation in the pulmonary functions during different phases of the menstrual cycle follows a cyclical pattern, which possibly could be due to the action of various hormones. Ovulation is followed by the formation of a corpus luteum, which secretes progesterone, the information on the variability of pulmonary functions which are relative to the menstrual phases is deficient [4]. Progesterone may also play a role in relaxation of bronchial smooth muscle, which ultimately causes improvement of lung function [5].

## 2. Method:

The study involved 50 healthy in follicular phase (group A) and 59 healthy premenopausal women in luteal phase (group B). Detailed personal medical and family history were taken. Subjects with history of chronic obstructive lung disease, smoking, BMI  $> 22.9$  Kg/m<sup>2</sup>, menstrual abnormalities, history of hormone replacement therapy, psychiatric disorders were excluded. Before examination, the aims, objectives and benefits of the study were explained to all the subjects and their unformatted written consent was taken. After teaching, the subjects exhaled forcefully until three acceptable values were obtained. The maximum values achieved were selected for analysis. The obtained values were also expressed as a percentage of predicted value according to age and height using the European Community of Coal and Steel (ECCS) reference equation [6]. This value is referred to PEFR %. Five milliliters were collected under aseptic precaution for estimation of progesterone level. Serum progesterone level was assessed by enzyme linked immunosorbent assay (ELISA) [7]. Data analysis was done by using SPSS window software package version 16.

## 3. Results:

The study involved 50 premenopausal female in follicular phase aged ( $30.6 \pm 8.6$ ) years, height ( $160 \pm 6.5$ ) cm, as in table (1-1) and 59 premenopausal female in luteal phase aged ( $26 \pm 7.1$ ) years, height ( $163 \pm 5.5$ ) cm. Correlation coefficient ( $r$ ) tests were done between serum progesterone level and (PEFR %). PEFR % was higher in luteal phase in compared to follicular phase of premenopausal women, the relationship was significant ( $p < 0.01$ ,  $r = 0.992$ ). Serum progesterone level was higher in luteal phase in compared to follicular phase of premenopausal women ( $P < 0.05$ ). There was a significant positive correlation between PEFR % and progesterone level in group A ( $P < 0.01$ ,  $r = 0.859$ ) and group B ( $p < 0.01$ ,  $r = 0.995$ ) as in table (1-2) and in fig (1), fig (2).

#### 4. Discussion:

In this study we noted that the PEFR% and progesterone level were higher in luteal phase in compared to follicular phase of premenopausal women. This study has shown a statistically significant relation between PEFR% and progesterone hormone in both group. Also there was a significant change in PEFR% between both group. The observed improved pulmonary function in luteal phase might be related to high progesterone level which induces hyperventilation by direct stimulation of respiratory center [8] and increasing Oxygen consumption due to increased metabolic rate [9]. Moreover progesterone may potentiate prostaglandin induced relaxation of bronchial smooth muscles. This relaxation is well obvious during luteal phase [10]. In addition, the role of progesterone as bronchial smooth muscle relaxant and its association with increased respiratory muscle endurance has also been put into explanation. Experimental evidence displayed that physiological concentration of progesterone causes increased mRNA content of progesterone receptor at hypothalamus during luteal phase. Thus the stimulatory effect on these receptors encourages hyperventilation [5].

Our study were in a good agreement with the study that done by Pai RP, et al that they found a higher level of PEFR and progesterone hormone in the luteal phase in comparison to those of menstrual and follicular phases of menstrual cycle. Progesterone may also has a role in relaxation of the bronchial smooth muscle which ultimately causes improvement of lung functions during luteal phase [10].

This present finding was consistent with previous investigation done by Rajesh, et al (2000) [8], Brutsaert, TD et al (2002) [11] and Rao GS, et al (1991) [12], that they observed the low peak expiratory flow during the premenstrual and the menstrual phases that point to a higher bronchial tone during these phases, even in normal women. The likely reason for the changes in the bronchial tone could be due to the changing levels of the sex hormones in the blood of menstruating women.

While this study was contrast to the study of Chong et al, (2000) [13], that it noted the menstrual cycle appeared to have a little effect on the peak expiratory flow rate in healthy non-asthmatic, Asian women.

**Conclusion:** The normal cyclical progesterone hormone level should be took considerably in interpretation of PEFR % . Hormonal therapy may play a role in condition that lead to PEFR % depression.

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Table (1): Mean and standard deviation (SD) for age and height for two groups

Group	Number	Mean $\pm$ SD	
		Age /year	height /cm
A	50	26 $\pm$ 7.1	163 $\pm$ 5.5
B	59	30.6 $\pm$ 8.6	160 $\pm$ 6.5

Table (2): The relation between progesterone and PEFR % in two group

Relation between pramaters	P value	r
Progesterone gp A vs progesterone gp B	P<0.01	0.334
PEFR % gp A vs PEFR % gp B	P<0.01	0.358
PEFR % gp A vs progesterone gp A	P< 0.01	0.859
PEFR % gp B vs progesterone gp B	P<0.01	0.995

Description for the table (2).

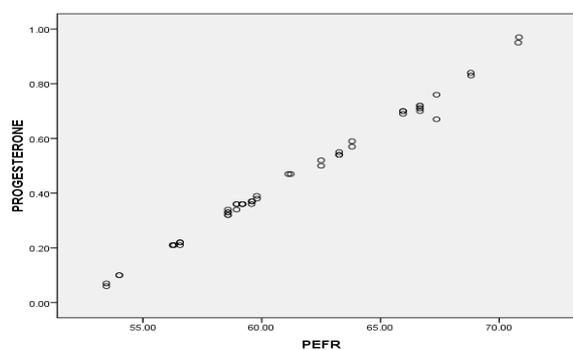


Fig (1): The relation between progesterone hormone and PEFR% in group (A)

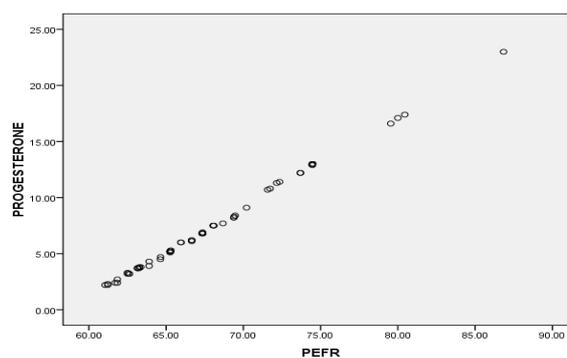


Fig (2): The relation between progesterone hormone and PEFR% in group (B)

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