



The Effect of Different Phases of the Menstrual Cycle on peak expiratory flow rate in normal, overweight and obese female With Primary Dysmenorrhea (An Observational Study).

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Abstract:

Background:

The menstrual cycle is not only an integral part of women's fertility but a vital sign of woman's health, too. Respiratory function should be normal and efficient to perform physical exercise as it demands more oxygen and blood supply. Progesterone is a cause of increased ventilatory capacity during luteal phase, as progesterone has its effect on airway smooth muscle relaxation. The estrogen dominated follicular phase has been shown to be associated with increased expiratory resistance.

Aim:

To evaluate the effect of different phases of menstrual cycle on peak expiratory flow rate in normal, overweight and obese female with primary dysmenorrhea.

Methodology:

Unmarried female [n=125] between age 18-24 years having regular menstrual cycle with primary dysmenorrhea of Pune City were included in this study. Verbal multidimensional scoring system was used for assessment of dysmenorrhea and PEFR was checked.

Outcome measures:

PEFR (peak expiratory flow rate), Verbal multidimensional scoring system and Adult Body Mass Index (BMI).

Results:

PEFR was highest in the luteal phase and lowest during the Menstrual phase. Which was proved statistically significant [p=0.0001].

Conclusion:

This study was done to check the Effect of Different Phases of the Menstrual Cycle on Peak Expiratory Flow Rate in normal, overweight and obese female With Primary Dysmenorrhea. Therefore this study concluded that there is altered Peak Flow Rate and it Varied in three Different phases of Menstrual Cycle which was highest in Luteal phase and lowest in Menstrual phase.

Keywords:

Unmarried Females, Verbal multidimensional scoring system, BMI, PEFR.

INTRODUCTION

The menstrual cycle is not only an integral part of women's fertility but a vital sign of a woman's health, too. One of the most common complaints of women during this cycle is dysmenorrhea or painful menstruation. Dysmenorrhea is divided into two types - primary and secondary. Primary dysmenorrhea refers to chronic and periodic pelvic pains in the absence of any proven pelvic disease and begins with menstrual hemorrhage or even before it and may continue for up to 72 hours.⁽¹⁾

Primary dysmenorrhea presents with or shortly after menarche. It may start within 6 months after menarche because it occurs only during ovulatory cycles, which may not always be evident at menarche. Characterized by fluctuating, spasmodic menstrual cramps, sometimes referred to as "labor-like" pains that begin only a few hours before or with the onset of menstrual flow, the symptoms of primary dysmenorrhea last only 2-3 days. The pains are most intense on the first or second day of the menstrual flow, or more precisely the first 24-36 hours, consistent with the time of maximal prostaglandin release into the menstrual fluid.⁽²⁾

Menstrual cycle is divided into three phases i.e. menstrual, follicular and luteal phase. During these different phases, rhythmic changes occur in the levels of ovarian hormones especially progesterone and estrogen. These changes are responsible for various physiological changes in our body. The variation in the pulmonary functions during different phases of menstrual cycle follows a cyclical pattern which could be due to the action of various hormones.⁽³⁾

After ovulation, corpus luteum is formed which releases progesterone. Levels of progesterone are low during the preovulatory or follicular phase. Progesterone causes relaxation of smooth muscle and relaxation of bronchial smooth muscle may have a beneficial effect on the airway functions.⁽³⁾

The physiologic interplay of hormones of the menstrual cycle distinctly divides it into the estrogen dependent proliferative (follicular) phase and the progesterone dependent secretory (luteal) phase.⁽⁴⁾

Progesterone is a cause of increased ventilatory capacity during luteal phase, as progesterone has its effect on airway smooth muscle relaxation. Progesterone has a role in relaxation of bronchial smooth muscle which reduces the contractile response of the respiratory muscles. The estrogen dominated follicular phase has been shown to be associated with increased expiratory resistance.⁽⁴⁾

The basic biology of the menstrual cycle is a complex, coordinated sequence of events involving the hypothalamus, anterior pituitary, ovary, and endometrium. The menstrual cycle with all its complexities can be easily perturbed by environmental factors such as stress, extreme exercise, eating disorders, and obesity.⁽⁵⁾

Respiratory function should be normal and efficient to perform physical exercise as it demands more oxygen and blood supply.

Excessive amounts of body fat adversely affect respiratory function and uptake of oxygen by skeletal muscles.

Obesity has long been recognized as having significant effects on respiratory function. Obese patients tend to have higher respiratory rates and lower tidal volumes.⁽⁶⁾

Menstrual cycle occurs in three phases menstrual, follicular and luteal which are regulated by the sex hormones - oestrogen and progesterone from the ovary and also by the gonadotropins - leutinizing and follicle stimulating hormone from the anterior pituitary. The level of these hormones in three phases of the menstrual cycle are fluctuating.⁽¹⁰⁾

Plasma progesterone in menstrual phase is near about zero level. These changes of hormone levels associated with menstrual cycle are known to affect different organ systems, including the respiratory system. Variations in the functional parameters of this system may be related to fluctuations in the hormonal levels during the different phases of menstrual cycle. Women continually experience a wide fluctuation in estrogen and progesterone levels during their menstrual cycles.⁽¹¹⁾

NEED OF STUDY

The cyclic hormonal changes during different phases of menstrual cycle are responsible for various physiological changes. Their effects on extra-reproductive systems like airway dynamics and respiratory efficiency are very few in literature. ⁽⁴⁾ As majority of Indian female have a favourable attitude towards participation in physical activity . it is significant to understand the variation in peak expiratory flow rate during different phases of menstrual cycle to have an optimum performance.

AIM

To evaluate the effect of Different phases of menstrual cycle on peak expiratory flow rate in normal, overweight and obese female with primary dysmenorrhea.

OBJECTIVES

- To evaluate Grades of Dysmenorrhea using verbal multidimensional scoring system.
- To evaluate PEFr of female during Day 2 of their Menstrual phase.
- To evaluate PEFr of female during Day 7 of their Follicular Phase.
- To evaluate PEFr of female during Day 22 of their Luteal Phase.

HYPOTHESIS

Null hypothesis (h₀)- There will be no effect of different phases of menstruation cycle on peak expiratory flow rate in normal , overweight, obese female with dysmenorrhea.

Alternative hypothesis (h₁)- There May be significant changes in PEFr in different phases of menstrual cycle in normal, overweight and in obese females.

METHODOLOGY

Sample size : 125

Study setting : In pune city

Study Design : Observational Study

Sample method : Conventional Sampling

Study population : Unmarried female between age 18-24 Years having. Regular menstrual cycle with primary dysmenorrhea.

Study duration : 6 months

Diagnostic criteria : verbal multidimensional scoring system for assessment of dysmenorrhea.

MATERIALS

Pen

Paper

Chair

Peak flow meter

Measuring tape

Weighing machine.

Verbal multidimensional scoring System.

INCLUSION CRITERIA

- Female between the age 18-24 years.
- Female Having regular menstrual cycle (28 ± 7 days).
- Female having primary dysmenorrhea.

EXCLUSION CRITERIA

- Females with respiratory and cardiovascular diseases.
- Female those who smokes cigarettes.
- Female who consumes alcohol.
- Female who consumes contraceptives.
- Female having PCOD.

PROCEDURE

Study began with the Presentation of synopsis to the ethical committee of PES MCOP.

Ethical clearance was granted by the Committee.

Then the subjects was selected on the basis of inclusion and exclusion criteria.

The subjects was explained about the studies before starting the procedure.

Consent was taken from the Subjects who wish to Participate in this study .

Anthropometric measurements was taken. Measurement of height was performed by measuring tape with participant in erect posture against a vertical surface, and weight by using weighing machine.

Participants was instructed to wear light clothes (culturally appropriate) and not to wear shoes while measuring the body weight. BMI in kg/m^2 was calculated. And then subjects was divided in 3 categories that is normal, obese and overweight.

The peak expiratory flow rate was recorded by instructing the subject to take deep inspiration. Then the subject was asked to expire forcefully into the mouth piece of the Peak flow meter after adjusting the knob to zero level .Three successive trails was performed and the maximum value was recorded during each of the three different phases of menstrual cycle i.e. menstrual phase, follicular phase and luteal phase.

STATISTICAL ANALYSIS

Statistical analysis was done by Repeated Anova Score . $P < 0.05$ was considered to be Statistically Significant.

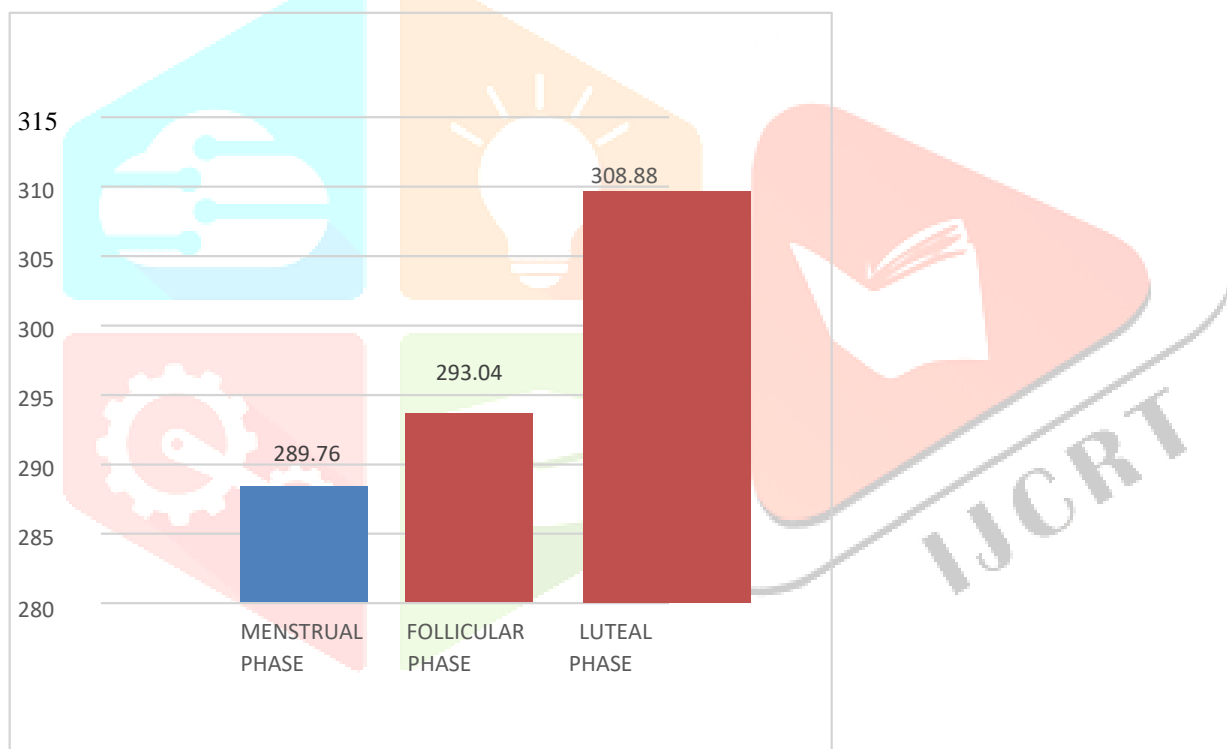
Microsoft Excel and Word was used for designing the table.

RESULT

Table no. 1: shows mean, standard deviation, P value , F value and F critical value of three phases of menstrual cycle.

PHASES	MEAN	STANDARD DEVIATION	P -VALUE	F -VALUE	F-CRITICAL VALUE
MENSTRUAL	289.76	43.24	0.0001	215.11	3.02
FOLLICULAR	293.04	42.37			
LUTEAL	308.88	42.54			

This statistical analysis shows that the study has p-value less than 5% of significance level. Study shows that PEFR varied significantly during different phases of menstrual cycle, with the highest in the luteal phase and lowest during menstrual phase.



graph no.1 shows mean of in PEFR in different phases of menstrual cycle.

DISCUSSION

In this study we recorded a relative increase in the peak expiratory flow rate during the luteal phase compared to the value in the menstruation phase and follicular phase of the menstrual cycle.

Oraki , Majid and Simim Also found similar finding which shows respiratory indices differ in various phases of the menstrual cycle in women with primary dysmenorrhea, which seems to be due to pain.⁽¹⁾

Elevated progesterone level and core temperature during the luteal phase of the menstrual cycle have shown increase in ventilation.

Progesterone has also been reported to have a role in relaxation of bronchial smooth muscle which reduces the contractile response of the respiratory. The effect of progesterone on pulmonary function during the luteal phase may be the explanation for the increase observed in this study. Progesterone causes increased Stimulatory effect on the increased mRNA content of progesterone receptor at the hypothalamus during the luteal phase results to hyperventilation.⁽⁴⁾

Samsudeen and Archana Rajagopalan Have found similar finding where they have observed significant increase in Cardiac and Respiratory Efficiency in Luteal phase of the menstrual Cycle.⁽⁵⁾

Increased pulmonary function in luteal phase might be related to high progesterone level which induces hyperventilation by direct stimulation of respiratory center and increasing Oxygen consumption due to increased metabolic rate.⁽¹²⁾

Progesterone may enhance prostaglandin induced relaxation of bronchial smooth muscles. This relaxation is well marked during luteal phase. role of progesterone is bronchial smooth muscle relaxant and it is associated with increased respiratory muscle endurance .⁽¹²⁾

Thus one can assert that bronchial smooth muscle relaxation and corresponding lung compliance is optimal during luteal phase. The findings from this study thus suggest that there is an improved respiratory function during the luteal phase of the menstrual cycle compared to the menstruation phase and this should be taken into consideration by health care givers.⁽¹²⁾

CONCLUSION

Therefore we can conclude that Peak Expiratory Flow Rate varied in three different phases of Menstrual Cycle which showed highest in Luteal phase and lowest in Menstrual phase.

LIMITATIONS

This study lacks Diurnal and seasonal variations for which further studies may be done to observe seasonal and diurnal variation of PEFr during different phases of menstrual Cycle.

This study lacks distribution of females according to BMI as there were less no. of obese females.

FUTURE SCOPE

Further research is suggested By including females with Respiratory Diseases .

Future study is also suggested by observing PEFr before and after giving Physiotherapy intervention in different phases of menstrual cycle.

Research can also observe effect of Different phases of menstrual Cycle On PEFr according to BMI..

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