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## RESEARCH ARTICLE

# A STUDY TO FIND OUT IMMEDIATE EFFECT OF RESPRATORY MUSCLE STRETCH GYMNASTIC ON PEAK EXPIRATORY FLOW RATEAMONG YOUNG GIRLS DURING THEIR MENSTRUATION PHASE – AN INTERVENTIONAL STUDY

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**ABSTRACT**

**Background**: Menstrual cycle is defined as cyclic events that take place in a rhythmic fashion during the reproductive period of a woman's life. Changes in the ovary during each menstrual cycle occur in two phases: A. Follicular phase B. Luteal phase. During the Luteal Phase Progesterone hormone level decreases which causes difficulty in breathing. Respiratory muscle stretch gymnastics which is designed to stretch inspiratory chest wall muscle during inspiration and expiratory chest wall muscle during expiration. Peak expiratory flow measurements are the most widely used tests to assess airflow limitation. **Objectives**: To find out immediate effect of respiratory muscle strength gymnastic on peak expiratory flow rate among young girls during their menstruation phase. **Method**: This study was carried out in and around Rajkot city. Subjects who fulfil exclusion and inclusion criteria were selected by purposive sampling. They were explained about the study, its usefulness and written consent were taken.30 subjects who were selected Respiratory Muscle Stretch Gymnastic Exercise was given and Pre &Post Peak expiratory flow rate was measured. **Result**: Pre-treatment and post-treatment Peak expiratory flow rate was analysed by Paired t-test, it was statistically significant (P value < 0.05). **Conclusion**: Respiratory muscle stretch gymnastic is effective in improving peak expiratory flow rate among young girls during their menstrual phase.



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## INTRODUCTION

Menstrual cycle is defined as cyclic events that take place in a rhythmic fashion during the reproductive period of a woman's life. Menstrual cycle starts at the age of 12 to 15 years, which marks the onset of puberty. The commencement of menstrual cycle is called menarche. Menstrual cycle ceases at the age of 45 to 50 years. Permanent cessation of menstrual cycle in old age is called menopause (Sembulingam, 2012). Mentrual cycle is divided into 2 phase (A) Follicular Phase (B) Luteal Phase. The follicular and luteal phase is separated by a brief period of ovulation. Oestrogen level increases during follicular phase until ovulation. Follicle Stimulating Hormone (FSH) level rises, and then has a short dip before a new rise, around ovulation. Luteinizing Hormone (LH) that initiates ovulation has a large surge in its level around ovulation. The serum levels of progesterone are very low during the follicular phase, but high during the luteal phase. These hormonal variations are responsible for various physiological changes as well as psychological changes. Level of Progesterone hormone decreases during Menstrual phase, Progesterone act as a smooth muscle relaxant and has Bronchodilator effect due to which respiratory symptoms are observed among females during menstrual phase (Kewal *et al.,* 2009; Golub *et al.,* 1983; Muizzuddin *et al.,* 2005). PEFR is the maximum flow achieved during an expiration delivered with maximal force starting from the level of maximal lung inflation. The value obtained may differ depending upon the physical properties of the instrument used to measure it (Mead, 1977). The force generated by the expiratory muscles, primarily abdominal. This is dependent on the force-length relationship and, hence, varies with the level of lunginflation (Potter *et al.,* 1971). Respiratory muscle stretch gymnastics (RMSG) which is desigened to stretch inspiratory chest wall muscle during inspiration and expiratory chest wall muscle during expiration (Yamada *et al.,* 1996). RMSG have profound effect on improving lung volume and capacity (Michael, 2008).

Five pattern are performed in RMSG (Hagbarth, 1985).

Pattern 1: Elevating and pulling back the shoulder
Pattern 2: Stretching the upper chest
Pattern 3: Stretching the back muscle
Pattern 4: Stretching the lower chest
Pattern 5: Elevating the elbow.

Most of the studies has concentrated to find out the changes in respiration system during menstrual phase and most of the

study has shown that respiratory muscle stretch gymnastic has significant effect in improving lung volume and capacities. So our need of the study is to find out immediate effect of respiratory muscle stretch gymnastics on peak expiratory flow rate among young girls during menstrual phase. Hypothesis of the study was:

**Null Hypothesis:** There is no significant effect of respiratory muscle stretch gymnastics on peak expiratory flow rate among young girls during menstrual phase.

**Alternative Hypothesis**: There is significant effect of respiratory muscle stretch gymnastics on peak expiratory flow rate among young girls during menstrual phase.

## MATERIALS AND METHODS

This study was carried out in and around Rajkot city. Subjects who fulfil exclusion and inclusion criteria were selected by purposive sampling. They were explained about the study, its usefulness and written consent were taken.30 subjects were selected their Pre-PEFR was taken then RMSG was given and Post-PEFR was taken thereafter.

**Inclusion Criteria**

- Age : 18 -25 years girls
- Gender: Only female participants.
- Subjects with Regular menstruation cycle
- Individual with ability to understand and follow the command.

**Exclusion Criteria**

- Respiratory illness
- Allergic condition
- Irregular menstruation
- Obesity
- Smoking
- Uncooperative subjects.
- Subjects who denied for participation.

**Material to be used**

- Chair
- Pen
- Paper
- Consent Form
- Measurement form
- Towel
- Peak expiratory flow rate instruments
- Sanitizer

**Procedure to measure PEFR**

- Subjects were given comfortable position on the table without back support and foot resting on the floor.
- For measurement of PEFR , subject were asked to take the deepest breath as much as possible then place the PEFR in mouth with lip sealing it and immediately forceful exhale and fast for as long as possible.
- 3 trials were given for each procedure and best trial was selected

**Procedure to perform RMSG**

Subjects were given standing position and made to perform 5 pattern 10 times each. Instruction was given to subjects that during each pattern after inspiration, Breath holding for 5 second and then expiration.

Pattern 1. Elevating and pulling back the shoulders.
As you slowly breathe in through your nose, gradually elevate and pull back both shoulders. After taking a deep breath, slowly breathe out through your mouth, relax and lower you shoulders.

Pattern 2. Stretching the upper chest.
Place both hands on your upper chest. Pull back your elbows and pull down your chest while lifting your chin and inhaling a deep breath through your nose. Expire slowly through your mouth and relax.

Pattern 3. Stretching the back muscle.
Hold your hands in front of your chest. As you slowly breathe in through your nose, move your hands front and downwards and stretch your back. After deep inspiration, slowly breathe out and resume the original position.

Pattern 4. Stretching the lower chest.
Hold the ends of a towel with both hands outstretched a shoulder height. After taking a deep breath, move your arm up while breathing out slowly. After deep expiration, lower your hands and breathe normally.

Pattern 5. Elevating the elbow.
Hold one hand behind your head. Take a deep breath through your nose. While slowly exhaling through your mouth, stretch your trunk by raising your elbow as high as is easily possible. Return to the original position while breathing normally. Repeat the process using the alternate hand behind the head.

## RESULTS

All the statistical analysis was done by Statistical Package for the Social Science (SPSS) statistical version 20.0 for windows. Paired Sample t – test was applied to find out the effectiveness of RMSG.

**Table 1. Descriptive Analysis of Pre and Post Data**

| | N | Mean | Std. deviation | Std. error mean |
|---|---|---|---|---|
| pre | 30 | 324.33 | 28.489 | 5.201 |
| post | 30 | 332.67 | 27.784 | 5.073 |

The level of Significance P value was <0.05.

There is a Statistical Significant difference between Pre-PEFR and Post-PEFR. Hence, Experimental Hypothesis was accepted, and Null hypothesis was rejected.

## DISCUSSION

The intent of the study wants to find out the immediate effect of respiratory muscle stretch gymnastic on peak expiratory flowrate among young girls during their menstruation phase. It included 30 females during menstruation between the age group of 18 to 22years; the subjects in a group of 30 subjects were assigned and given RMSG. In the present study, when the values of Pre-PEFR and Post-PEFR was analysed, it was statistically significant.

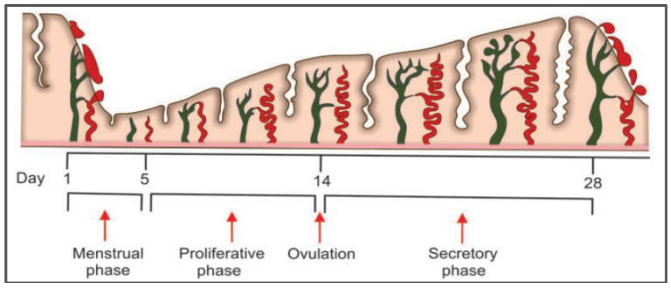
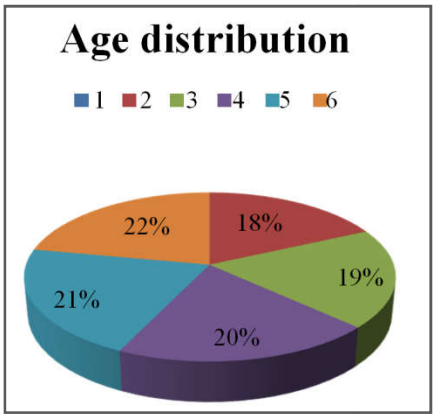
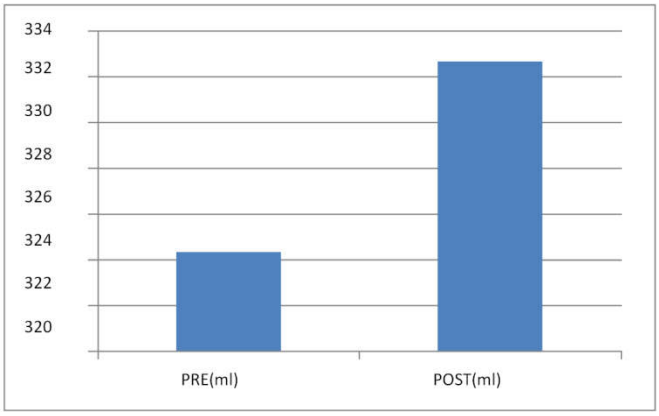



**Figure 1. Phases of menstrual cycle**




**Graph 1. Age Distribution**




**Graph 2. Pre and post Value of PEFR**

Hence it follows the Experimental Hypothesis. The theory of Laplace's law suggests that ventilation in the lungs is affected by the length of muscle which relates to the maximal force of either diaphragm and intercostals muscles. There are some studies which have been shown that stretching of certain muscles around shoulder joint can increase vital capacity (Kian-Chung Ong, 2012). Hagbarth et al. reported RMSG, designed to stretch the respiratory muscles which affected chest wall compliance and decreased chest wall stiffness hence improved the pulmonary function and chest expansion

### Clinical implication

Respiratory muscle stretch gymnastic showed statistical significant difference in pulmonary functions. Hence these technique can be used as an adjunct with other techniques for improving pulmonary functions in individual who have reduce lung volumes and capacities.

### Limitations

- The Sample size was relatively small.
- Study duration of the treatment protocol was short.
- Only female participants were included in the study population.
- Blinding was not done in the study.

### Further recommendations

- Study can be done with large sample size.
- Treatment can be given for longer duration with follow up.
- Other pulmonary function parameters and outcome measures like PEFR, Chest expansion can be used.
- Different populations who have reduced lung volume and capacities can be studied.
- Blinding could be done in future study.

### Conclusion

Respiratory muscle stretch gymnastic iseffective in improving peak expiratory flow rate among young girls during their menstrual phase.

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### Abbreviations

Peak Expiratory Flow Rate (PEFR)
Respiratory Muscle Stretch Gymnastic (RMSG)
Follicle Stimulating Hormone (FSH)
Luteinizing Hormone (LH)

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