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# COMPARISION OF RESPIRATORY MUSCLE STRENGTH IN DIFFERENT TRIMESTER OF PREGNANCY

Physiotherapist

**Mansi Agrawal*** Intern, DVVPF's College of Physiotherapy. *Corresponding Author

**Dr. Reshma Kolase** Assistant Professor, DVVPF's College of Physiotherapy.

## ABSTRACT

During pregnancy, pregnant women undergo significant anatomical and physiological changes to nurture and accommodate the developing fetus. This observational study is to evaluate the RMS that is maximum inspiratory pressure and maximum expiratory pressure and henceforth as a part of rehabilitation protocol we improve the RMS by adding respiratory muscle training in the first trimester of pregnancy. It helps to reduce dyspnoea and fatigue and make breathing easier for the patient and improve pulmonary function and also the maternal quality of life. The present study concluded that the respiratory muscle strength including both inspiratory and expiratory strength was less in all three trimesters of pregnancy.

## KEYWORDS

MEP, MIP, Respiratory Muscle Strength, Pregnancy, Trimester, 1ST, 2ND, 3RD.

## INTRODUCTION

During pregnancy, pregnant women undergo significant anatomical and physiological changes to nurture and accommodate the developing fetus. one of the changes is progressive uterine distension, which causes a diaphragmatic elevation in the late pregnancy which results in decreased functional residual capacity. The enlarging uterus increases the end-expiratory abdominal (gastric) pressure. thereby displacing the diaphragm upwards [1].

With pregnancy progression, the resting position of the diaphragm moves 5 cm upward with the increasing uterus size, as shown by chest radiograph measurement [2,3]. One of the most common problems that a woman, throughout her pregnancy suffers from is dyspnea, which is estimated to be prevalent in approx. 60-70% of healthy pregnant women [4].

The reason for the dyspnea is a significant increase in oxygen demand during normal pregnancy. This is due to a 15% increase in the metabolic rate and a 20% increased consumption of oxygen. Depending upon the pulmonary capacities and volume during pregnancy, the behavior of respiratory muscular strength during this period remains uncertain. So, the respiratory muscle strength can be reflected by the maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP). They are a simple and non-invasive clinical tool for measuring respiratory muscle strength which is of both diagnostic and prognostic value [5]. Oxygen consumption increases at the beginning of the first trimester, and by 20-33% per term, because of fetal demands and increased maternal metabolic processes [6].

The progressive increase in progesterone and estrogen during pregnancy is one of the factors that account for an increase in physical demands and hyperventilation [7,8,9]. Respiratory parameters such as residual volume (RV), expiratory reserve volume (ERV), and functional residual capacity (FRC), which are gradually reduced in the second half of pregnancy [10]. The forced vital capacity (FVC) increases significantly over 14-16 weeks of pregnancy, and FVC % is higher in multiparas than in primiparas, suggesting that changes in FVC occurring during pregnancy also continue after delivery [11]. Increased progesterone secretion during pregnancy raises the sensitivity of the CO2 respiratory center and reduces the airway tone, thereby increasing the ventilation of the lungs. This results in a decreased partial pressure of carbon dioxide in the blood and consequently in an increase in PaO2

## AIMS

To compare the respiratory muscle strength in the different trimester of pregnancy.

## OBJECTIVE

1. To assess the maximal inspiratory pressure (MIP) in first, second and the third trimester of pregnancy.
2. To compare the maximal inspiratory pressure (MIP) in first, second and the third trimester of pregnancy.
3. To assess the maximal expiratory pressure (MEP) in the first, second, third trimester of pregnancy.
4. To compare the maximal expiratory pressure (MIP) in the first, second, third trimester of pregnancy.

## STUDY SET UP

Study conducted in Vikhe Patil Memorial Hospital, Ahmednagar city.

## INCLUSION CRITERIA

Healthy pregnant women in hospital, age group between 20-30.

## EXCLUSION CRITERIA

Patient not willing to participate, Presence of significant cardiopulmonary or musculoskeletal disorders.

## STUDY DESIGN

The study is cross sectional comparative study set up at Vikhe Patil Memorial Hospital, Ahmednagar City. Cases will be divided into three groups according to their trimester of pregnancy.

## METHEDOLOGY

The ethical clearance from the ethical committee of the college of physiotherapy was obtained. Subjects fulfilling the inclusion and exclusion criteria were included in the study. Participants willing to participate in the study were screened for inclusion and exclusion criteria. Participants meeting the inclusion criteria were included in the study. The entire procedure involved in the study was explained to each subject. After explaining the purpose of the study, written informed consent was obtained from the participants

- Initial assessment of the study group was done which included demographic data, height, weight, MIP, MEP
- The procedure of Maximum Inspiratory Pressure and Maximum Expiratory Pressure:
- The manoeuvre consists of a maximum inspiratory effort against a closed airway and requires a considerable degree of patient cooperation and coordination.
- Pressures were measured with the subject seated. The physiotherapist demonstrated the correct manoeuvre.
- For MEP, the participant was instructed to inhale completely, seal the lips around the mouthpiece and then blow out hard.
- For MIP, the participant was instructed to exhale completely, seal the lips around the mouthpiece and then pull in hard.
- Manoeuvre was repeated at least three times and until two identical readings were obtained. Pressures were maintained for at least one second. An interval of about one minute was given between these efforts.
- The normal MIP and MEP will be measured with the-
- MIP (cm H2O) (Females) : 108.267- Age* (0.406) – Ht+ (0.191) + Wt+ +(0.261)
- MEP (cm H2O) (Females): 57.310 – Age* (0.394) + Ht+ (0.095) + Wt+ (0.233).

## RESULT

The present study was conducted on 36 pregnant women which were further divided into the 3 groups 12 women in each, according to three different trimesters.

The mean value for MIP in the 1st,2nd, and 3rd trimester of pregnancy was (41.67±11.93, 26.67±12.67, and 86.94±1.65 simultaneously)

The mean value for MEP in the 1st,2nd, and 3rd trimester of pregnancy

was (92.92±16.85, 50±12.8, and 30.84±11.65simultaneously)

**Table 1- Mean Value Of Normal And Recorded Mip In Pregnancy**

| Trimester | MIP in pregnant women | |
|---|---|---|
| | Normal value | Recorded value |
| 1st | 81.57 | 41.67 |
| 2nd | 85.00 | 26.67 |
| 3rd | 86.94 | 11.25 |

**Table 2-mean Value Of Normal And Recorded Mep In Pregnancy**

| Trimester | MEP in pregnant women | |
|---|---|---|
| | Normal value | Recorded value |
| 1st | 73.51 | 92.92 |
| 2nd | 75.72 | 50 |
| 3rd | 77.47 | 30.84 |

**Table 3 -mean Value Of Recorded Mip And Mep In Pregnancy**

| Trimester | MIP recorded | MEP recorded | p-value |
|---|---|---|---|
| 1st | 41.67±11.93 | 92.9±16.85 | <0.0001 |
| 2nd | 26.67±12.67 | 50±12.8 | <0.0001 |
| 3rd | 11.25±5.69 | 30.8±11.65 | <0.0001 |

## DISSCUSSION-

The present study intended to check the respiratory muscle strength in three different trimesters of pregnancy. The respiratory muscle strength is measured using MIP and MEP devices.

The study shows that MIP and MEP values are reduced in all three trimesters of the pregnancy.

Table no. 1 shows the normal and recorded value of MIP in all three trimesters of pregnancy. And the recorded value is less as compared to their normal value.

Table no. 2 shows the normal and recorded value of MEP in all three trimesters of pregnancy. And the recorded value is less as compared to their normal value according to their age and height. And the difference between them is statistically significant. And there is a reduction in inspiratory muscle strength and expiratory muscle strength which is more significant in the 3rd trimester as compared to the 2nd and 1st trimester. Pregnancy may also be accompanied by a subjective feeling of breathlessness without hypoxia and is most common in the 3rd trimester.

The mean value of MEP is (92.92±16.85) in the 1st trimester, the mean value is (50±12.8) in the 2nd trimester, and the mean value is (30.84±11.65) in 3rd trimester. This indicates that the MEP value is the least in the 3rd trimester.

The MIP and MEP values are extremely significant in all three trimesters ($p < 0.001$).

Table no.3 shows the mean value of respiratory muscle strength that is MIP and MEP in all three trimesters. The mean value of MIP is (41.67±11.93) in the 1st trimester, the mean value of MIP is (26.67±12.67) in the 2nd trimester and the mean value is (11.25±5.69) in 3rd trimester. Which indicate that the MIP values are least in the 3rd trimester when compared to 2nd and 1st.

## CONCLUSION-

The study concludes that respiratory muscle strength that is maximal inspiratory pressure and maximum expiratory pressure is reduced in all three trimesters of the pregnancy. Both MIP and MEP are reduced and it is least in the third trimester of pregnancy when compared with second than with the first trimester.

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