

Original Research

Determination of pulmonary function tests in different trimester of pregnancy

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ABSTRACT:

Background: Maternal physiological changes are the normal adaptations that a woman undergoes during pregnancy to accommodate the embryo or foetus. The present study was conducted to assess pulmonary function tests in pregnancy.

Materials & Methods: The present study was conducted on 60 pregnant women. Equal number of non pregnant women was also included. Subjects were divided into 4 groups. Group I were non-pregnant women, group II subjects were in 1st trimester, group III were in 2nd trimester and group IV were in 3rd trimester. FVC and PEF was recorded using computerized spirometer.

Results: The mean FVC in group I was 97.2%, in group II was 83.5%, in group III was 87.2% and in group IV was 86.4%, PEF in group I was 74.6%, in group II was 58.2%, in group III was 54.2% and in group IV was 50.4%. The difference was significant ($P < 0.05$).

Conclusion: Authors found that there is alteration in pulmonary parameters during different trimesters of pregnancy.

Key words: Pregnancy, pulmonary function tests, Spirometer.

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INTRODUCTION

Maternal physiological changes are the normal adaptations that a woman undergoes during pregnancy to accommodate the embryo or foetus. The awareness about various physiological respiratory changes in each trimester helps us to avert complications.⁵ Previous studies evaluating the effect of pregnancy on pulmonary function have shown that both minute ventilation (V_E) and tidal volume (V_T) are increased, whereas the functional residual capacity (FRC) and expiratory reserve volume (ERV) are decreased. The values obtained by forced spirometry, including forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), and peak expiratory flow (PEF) have largely been found to remain unchanged during pregnancy. In other studies, PEF is found to decrease with advancing gestational age and to be affected by maternal positioning and by living at high altitude.²

The body must change its physiological and homeostatic mechanisms in pregnancy to ensure the requirement of the foetus. The alterations in respiratory physiology has been attributed to Progesterone which was thought to increase ventilation by increasing respiratory center sensitivity to carbon dioxide as a result the tidal volume and minute ventilation is increased.³

Suboptimal pulmonary function in pregnancy has been associated with adverse pregnancy outcome. Pulmonary disease can affect pregnancy outcome and pregnancy can affect the course of pulmonary disease.⁴ The pregnancies of women with asthma are more likely to be complicated by pre-eclampsia, preterm birth, and lower birth weight than pregnancies in non-asthmatic women. Studies have reported a direct relationship between maternal FEV1 during pregnancy and infant birth weight and an inverse relationship with

intrauterine growth retardation, gestational hypertension, and preterm birth in asthmatic women. In pregnant women with cystic fibrosis, low FEV1 is associated with preterm delivery.⁵ The present study was conducted to assess pulmonary function tests in pregnancy.

MATERIALS & METHODS

The present study was conducted on 60 pregnant women in the department of Physiology. Equal number of non pregnant women was also included. All subjects

were informed regarding the study and written consent was obtained.

Data such as name, age etc. was recorded. Subjects were divided into 4 groups. Group I were non-pregnant women, group II subjects were in 1st trimester, group III were in 2nd trimester and group IV were in 3rd trimester. Spirometer was used for recording the pulmonary function tests. Vital parameters and anthropometric measurements were taken. FVC and PEFR was recorded using computerized spirometer. The results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

Groups	Group I	Group II	Group III	Group IV
Status	Non-pregnant	1st trimester	2nd trimester	3rd trimester
Number	60	20	20	20

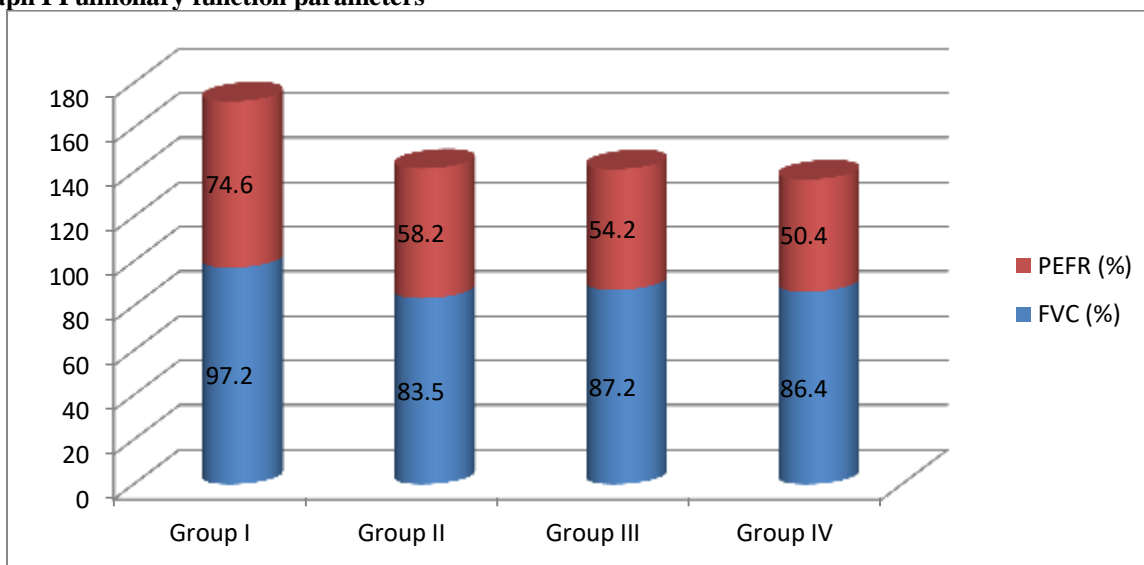
Table I shows that group I were non-pregnant women, group II subjects were in 1st trimester, group III were in 2nd trimester and group IV were in 3rd trimester. Group I had 60 and other groups had 20 subjects each.

Table II Pulmonary function parameters

Groups	FVC (%)	PEFR (%)
Group I	97.2	74.6
Group II	83.5	58.2
Group III	87.2	54.2
Group IV	86.4	50.4
P value	0.05	0.02

Table II shows that mean FVC in group I was 97.2%, in group II was 83.5%, in group III was 87.2% and in group IV was 86.4%, PEFR in group I was 74.6%, in group II was 58.2%, in group III was 54.2% and in group IV was 50.4%. The difference was significant (P< 0.05).

Graph I Pulmonary function parameters



DISCUSSION

Any change in pulmonary function during pregnancy may have an impact on the clinical evaluation of pregnant women with pre-existing pulmonary disease. The National Institutes of Health and the American College of Obstetricians and Gynecologists (ACOG) have approved the use of PEFs measured by inexpensive portable flow meters in the assessment and management of obstructive lung disease during pregnancy.⁶ This endorsement is based upon the assumptions that PEF correlates well with FEV1, and that PEF remains unchanged during pregnancy in healthy women.⁷ However, there seems to be no consensus on whether or not the percentage of predicted FEV1 (FEV1%) and PEF (PEF%) can be used interchangeably in the assessment of airways obstruction. The correlation between FEV1% and PEF% has been described as moderate, with wide limits of agreement in patients with established obstructive ventilatory defects. In patients with mild airways obstruction, PEF% overestimated FEV1%.⁸ The present study was conducted to assess pulmonary function tests in pregnancy.

In this study, group I were non-pregnant women, group II subjects were in 1st trimester, group III were in 2nd trimester and group IV were in 3rd trimester. Group I had 60 and other groups had 20 subjects each. Dudhamal et al⁹ found that FVC and PEF decreased significantly in pregnancy irrespective of trimester in comparison to controls. FVC did not show significant variation in all trimesters of pregnancy. In the third trimester of pregnancy PEF showed significant decrease. Between the groups there was significant increase in progesterone levels. FVC and PEF were significant, positive and was correlated with progesterone in first trimester of pregnancy. There was positive and significant correlation of FVC and Progesterone in third trimester of pregnancy.

We found that mean FVC in group I was 97.2%, in group II was 83.5%, in group III was 87.2% and in group IV was 86.4%, PEF in group I was 74.6%, in group II was 58.2%, in group III was 54.2% and in group IV was 50.4%. Previous studies finding no changes in either PEF or FEV1 during pregnancy would support the validity of a fixed positive correlation between the two values. In our study we found FEV1 and FEV1% to remain unchanged during pregnancy, whereas PEF and PEF% increased significantly.¹⁰ Brancazio et al¹¹ found that PEF did not change during pregnancy and concluded that PEF measurements by inexpensive portable flow meters may reliably be used to evaluate respiratory diseases such as asthma during pregnancy. Griendheim et al¹² in their study the women were studied with repeated measures of lung function

using spirometry at a gestational age of 14–16, 22–24, 30–32 and 36 weeks and at 6 months postpartum. Main outcome measures forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), and peak expiratory flow (PEF), also expressed as a percentage of predicted values according to age and height: i.e. FVC%, FEV1%, and PEF%. Both FVC and FVC% increased significantly after 14–16 weeks of gestation as was the case for both PEF and PEF%. FVC, FVC%, PEF, and PEF% in early and mid-pregnancy were significantly lower compared with the postpartum value. Nulliparous women had an overall 4.4% lower value of FVC% than parous women. There were no differences in FVC, FEV1, or PEF dependent upon pregestational overweight or excessive weight gain. The shortcoming of the study is small sample size.

CONCLUSION

Authors found that there is alteration in pulmonary parameters during different trimesters of pregnancy.

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