

COMPARISON OF ARTERIAL OXYGEN SATURATION LEVEL AMONGST PREGNANT AND NON-PREGNANT WOMEN

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Abstract

Background: These altered physiologic and metabolic conditions reportedly increases oxygen consumption, to many folds during pregnancy. The aim is to evaluate and compare the arterial oxygen saturation level amongst pregnant and non-pregnant women. **Materials and Methods:** A total of 240 subjects in the age range of 20-35 years were evaluated. The study subject where randomly selected equal number of pregnant and non-pregnant women. The arterial oxygen saturation was measured using a pulse oximeter. Three consecutive readings were taken and the middle value was noted. **Result:** In the pregnant group the number of subjects were maximum in the age range of 26-30 years and were minimum in the age range of 36-40 years. The pattern was similar in the control group. The mean age (\pm SD) for the pregnant group and the control group were 30 ± 22.92 and 30 ± 18.24 years respectively. The mean arterial oxygen saturation value for the pregnant women in the first trimester was 96.72 ± 1.33 , in the second trimester 96.80 ± 1.30 and in third trimester it was 96.85 ± 1.09 while in the control group it was 97.15 ± 1.08 . A comparison of the mean value of the three trimester with the control group showed no statistical significant difference. **Conclusion:** Pregnancy causes little or no change in pulmonary function or arterial blood saturation.

INTRODUCTION

Pregnancy is normal to life time condition, which causes considerable amount of stress and alters physiologic as well as metabolic condition of the body. These altered physiologic and metabolic conditions reportedly increases oxygen consumption, to many folds during pregnancy. This gradual rise in oxygen demand may be primarily due to the higher metabolic demand of the foetus and also may due to the increase cardiac output and respiratory cause.^[1,2,3] The increased ventilation and exchange of blood gases goes considerably high in pregnancy. The ribs and joints also undergoes structural changes due to gradual relaxation of ligaments and its attachments and increasing subcostal angle. The diaphragm is also elevated in pregnancy by 4 to 5 cm and the ribcage diameter at its lower border also increases. Therefore the functional residual capacity and residual volume decreases drastically.^[4,5,6] The decrease functional residual capacity along with an increased demand of oxygen reduces the reserve oxygen of pregnant mother. This lowered oxygen

reservoir and increased metabolic demand makes the pregnant women prone to develop hypoxia. Almost three quarter of healthy women during pregnancy feels breathlessness during day-to-day activity.^[7] Pulse oximeter is a safe and non-invasive machine that measures arterial oxygen saturation. On the other hand the blood gas analyser requires blood and therefore invasive and causes pain.^[8,9] There is no unison worldwide, regarding arterial blood gas saturation level in pregnant women. Therefore, this study was undertaken to evaluate and compare the arterial oxygen saturation level amongst pregnant and no pregnant women.^[10]

MATERIALS AND METHODS

Study Design

This was a prospective, cross-sectional study, conducted in the Department of physiology, at Lord Buddha Koshi Medical College and Hospital, Saharsa. The study was approved by the institutional research and ethical committee. The study was conducted over a period of 15 month from May 2020

to July 2021. An informed and written consent was obtained from the participating subjects prior to the commencement of study.

Study Sample

The study sample consisted of 120 pregnant and 120 nonpregnant women in the range of 20-40 years. The study subject were randomly selected from the Obstetrics and Gynaecology OPD of our institute. The pregnant women group consisted of the subject coming for antenatal check-up and the control group consisted of their relatives.

Inclusion Criteria

- 20-40 years of age
- No systemic disease
- No mental illness
- Non complicated pregnancy

Exclusion Criteria

- History of smoking
- Anaemia
- Lung disease
- Pregnancy induced diseases
- Lactating women
- Women on contraceptive pills
- Athlete women

Procedure

After explaining the procedure, the participating subjects were asked to sit relax for 10 mins. The arterial oxygen saturation was measured using a pulse oximeter. Three consecutive readings were taken and the middle value was noted.

Statistical Analysis:

All the data was tabulated in a Microsoft excel spread sheet. Descriptive statistical analysis was done using SPSS Software version 16.0

RESULTS

The demographic characteristics of the subjects is shown in [Table 1]. In the pregnant group the number of subjects were maximum in the age range of 26-30 years and were minimum in the age range of 36-40 years. The pattern was similar in the control group. The mean age (\pm SD) for the pregnant group and the control group were 30 ± 22.92 and 30 ± 18.24 years respectively.

The educational status and the employment status of the participating subjects are shown in [Table 2 and Figure 1]. A majority of the pregnant subjects were employed while on contrast, majority of the attendants were non-working. Maximum subjects were educated till the higher secondary or graduation in both groups.

The mean arterial oxygen saturation value for the pregnant women in the first trimester was 96.72 ± 1.33 , in the second trimester 96.80 ± 1.30 and in third trimester it was 96.85 ± 1.09 while in the control group it was 97.15 ± 1.08 . A comparison of the mean value of the three trimester with the control group showed no statistical significant difference. [Table 3]

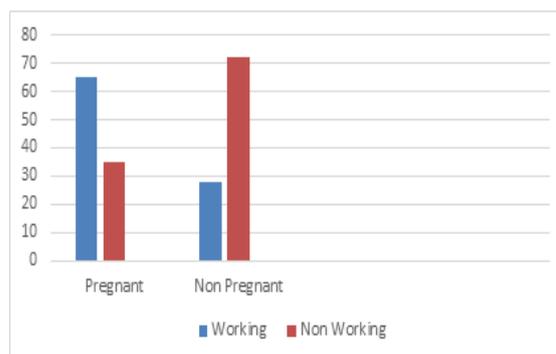


Figure 1: Employment status of the subjects.

Table 1: Distribution of subjects according to age.

Age in Years	Non pregnant (n=120)	Pregnant (n=120)
20-25	32	28
26-30	55	62
31-35	18	22
36-40	15	08
Mean \pm SD	30 ± 18.24	30 ± 22.92

Table 2: Educational status

Educational status	Non pregnant	Pregnant
	(n=120)	(n=120)
Illiterate	12	15
Non matric	15	19
10th pass	7	6
12th pass	35	31
Graduate	38	40
Post graduate	13	9

Table 3: Mean value and comparison of arterial oxygen saturation in both groups.

	Control Group	Pregnant Group	p- value
	Mean \pm SD	Mean \pm SD	
1 st Trimester	97.15 ± 1.08	96.72 ± 1.33	0.0513
2 nd Trimester		96.80 ± 1.30	0.1.78
3 rd Trimester		96.85 ± 1.09	0.1247

DISCUSSION

The present study endeavoured to measure the arterial oxygen saturation amongst pregnant and non-pregnant women. A total of 480 subjects comprising of 360 pregnant and 120 non-pregnant women participated towards the success of this study.

In the present study, we found no statistically significant difference in the mean values for arterial oxygen saturation between pregnant women of any trimester and non-pregnant women. This observation was in contrast to the previous study of Sunayal et al. The study report of Sunayal et al.^[8] shows a gradually increasing oxygen saturation from first to third trimester. And this was highly statistically significant. A prolonged night time hypoxia is reported amongst pregnant women by Bourne.

We found no significant difference in arterial oxygen saturation between pregnant and non-pregnant women. However, the literature suggests hypoxia in pregnancy due to decreased functional residual capacity and increased oxygen demand. This difference in observation may be due to increased tidal volume.

An additional explanation for this could be increased cardiac output and better perfusion due to decreased dead space in pregnancy. Due to the above the lungs remains unaffected.

Progesterone is suggested to be a respiratory stimulant. External administration of progesterone may cause ventilation. In pregnancy, the progesterone level increases causing respiratory stimulation and on the other hand the increased metabolic demand of foetus causes increased oxygen consumption and therefore, as a resultant the respiratory system remains in equilibrium.

CONCLUSION

The state of pregnancy, embraces both the increasing and decreasing factors for respiratory function and resultant arterial blood gas exchange. Therefore, pregnancy causes little or no change in pulmonary function or arterial blood saturation.

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