Online Journal of Gynecology, Obstetrics and Maternity Care
ISSN: 2642-0163

Research Article *Volume 3 Issue 3*

Effectiveness of Oxygen Inhalation on Vaginal Blood Loss among Mothers in the Third and Fourth Stage of Labour

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Received Date: May 07, 2020; **Published Date:** June 05, 2020

Abstract

Oxygen- a life saving drug and a "Uterine tonic". Major Etiology of postpartum uterine atony- hypoxia. Enhancing oxygen delivery to myometrium through additional inhaled oxygen (active management of third and fourth stage of labour) may improve uterine contractions, thereby reduces the duration of labour and blood loss too.

Objective: The main Objectives of the Study is to evaluate the effect of Oxygen Inhalation on the Vaginal Blood Loss among the mothers in the experimental group in compare with the control group.

Methodology: The research approach & design selected for this study was Quantitative approach and Experimental design. The setting was Labor Room and the sample size were 50 (25 in control and 25 in experimental group) selected through simple random sampling technique. General profile including the socioeconomic status of the subjects was assessed using kuppuswamy's, socioeconomic status scale 2012. Experimental group received 8L/min of oxygen via face mask for a period of two hours during third and fourth stage of labor, whereas the control group inhaled the room air alternatively. Vaginal blood loss was weighed using Kelly's pad followed by weighing the soaked vaginal pads after episiotomy suture done.

Result and Findings: The findings of the study shows that the mean vaginal blood loss at the end of first hour was 259.6ml ± 52.34 and 228.2ml ± 30.88 for the control and experimental group respectively, the calculated't' value is 2.31 shows the 'p' value 0.029 was statistically significant. The mean vaginal blood loss at the end of second hour was 136.08ml ± 25.56 and 84.6ml ± 15.54 for the control and experimental group respectively, the calculated 't' value is 9.45 shows the 'p'value 0.000* was statistically significant. Therefore it was inferred that there is a positive effect of oxygen inhalation on vaginal blood loss among the mothers in the third and fourth stage of labor in the experimental group. There was a positive correlation between the duration of third stage of labor and the amount of vaginal blood loss score r = 0.482 in experimental group. In relation to the hypothesis testing, it shows that there was a significant effect of oxygen inhalation on vaginal blood loss among mothers in the experimental and control group.

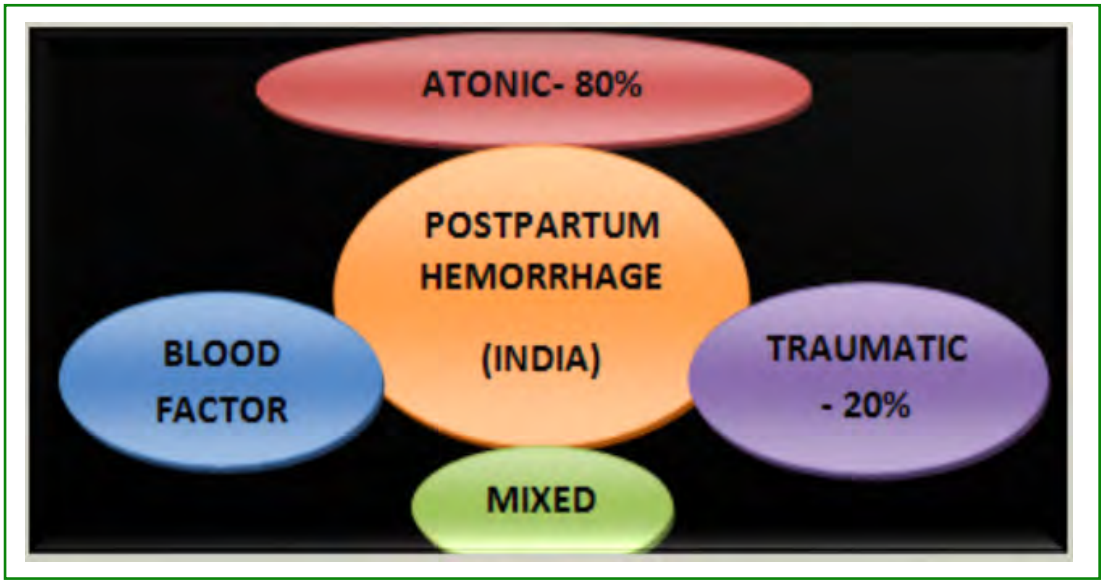
Conclusion: Thus above study results highlights & proved statistically that there was a positive effect of oxygen inhalation on vaginal blood loss among the mothers in the third and fourth stage of labor.

Keywords: Etiology; Postpartum; Oxygen Inhalation; Experimental design; Vaginal blood loss

Abbreviations: WHO: World Health Organization.

Introduction

Active management of third stage of labour involves prophylactic administration of an uterotonic agent, early cord clamping and cutting, and controlled cord traction which reduce the incidence of PPH by 40%. Oxygen- a lifesaving drug and a "Uterine tonic". Major Etiology of postpartum uterine atony- hypoxia. Enhancing oxygen delivery to myometrium through additional inhaled oxygen (active management of third and fourth stage of labour) may improve uterine contractions. One quarter of all maternal deaths are due to hemorrhage i.e. at least 13,000 annually worldwide (WHO- 2011). 122 maternal deaths per 100,000 live births in developing nations including India (SRS 2015-17). Most of these deaths occur within 4 hours of delivery. The main causes of MMR are PPH-25%, Eclampsia-12%, Septic Abortion-12%, Heart Disease-13%, Amniotic fluid embolism-13%, CVA-19%, Pregnancy and Jaundice-6%. Major causes for the postpartum hemorrhage [1-9].



Enhancing oxygen supplementation to myometrium through additional inhaled oxygen about 8 L/min via face mask for 2 hours following the vaginal delivery may improve uterine contractions, which prevents PPH and it also prevents the excess loss of blood in the normal postpartum period and thereby prevents the postpartum anemia.

Objectives of the Study

- To assess the Baseline Variables among the mothers in the third and fourth stage of labor in control and experimental group.
- To Administer Oxygen via face mask to the mothers in the experimental group.
- To evaluate the effect of Oxygen Inhalation on the Vaginal Blood Loss among the mothers in the experimental group in compare with the control group.
- To associate the amount Vaginal Blood Loss of the mothers in the study groups with their selected baseline variables.
- To correlate the duration of Third stage of labor with the amount of Vaginal Blood Loss.

Hypothesis

- $H_{1:}$ There is a significant effect of oxygen inhalation on vaginal blood loss among mothers in the experimental group compare to the control group.
- $H_{2:}$ There is a significant association between the amounts of blood loss with the selected baseline variables.
- $H_{3:}$ There is a significant correlation with the duration of third stage of labor and amount of blood loss.

Methodology

Research Approach and Design

The research approach used for this study is quantitative approach. The research design selected for this study is Experimental design with two groups experimental and control group [10,11]. The effect of oxygen inhalation on vaginal blood loss is assessed in two groups, group I and group II respectively. The present study was conducted in labor room among Intra-natal mothers in a selected Maternity Hospital, Puducherry. All the mothers admitted for delivery in the Labour Room in the selected Hospital, Puducherry. The

sample selected for the present study was 50 mothers who fulfill the inclusion criteria. 50 divided into two half, 25 in experimental group and 25 in control group. The method of sampling technique employed was simple random sampling. The sample selection was done as follow: Random Allocation of Samples was used. Keeping this in mind the researcher randomly assigned to both groups. Hence the researcher randomly assigned alphabetical letters by using lot system for both groups. The designated alphabetical letter for the experimental groups was E and for the control group the designated alphabetical letter was C. Mother's was selected on the basis of the inclusion and exclusion criteria. Inclusion Criteria of the study was Mothers who were in labor: Admitted in or after second stage of labor; Gestational age between 37 and 42 weeks; Cephalic presentation; Normal vaginal delivery with normal new born; Parity between one and five; Hemoglobin value- 10 gm and above; (low Hb in the blood leads to decrease oxygen carrying capacity). The Exclusion Criteria was Mothers who were in labor**:** Blood pressure ≥ 140/90mmhg; Placenta abnormalities (previa abruption); A history of any bleeding during pregnancy; Previous history of Cesarean section or any uterine scar; Signs or symptoms of maternal infection; Known uterine anomalies; History of any drug use during labor; Coagulation defects; Instrumental deliveries; History of anticoagulant drugs; Prolongation of the first stage of labor > 15 hours etc. The tools of data collection translate the research objectives into specific questions or items, the responses to which will provide the data required to achieve the research objectives. The research tool was developed by doing an extensive review of literature from books, journal articles, and experts' opinion and suggestions. The tool for the data collection consists of two sections.

Section A

Comprising of Questions for assessing demographic variables. It has 3 parts. Part I: General profile of mother name, age, height and weight; Part II: socio economic status-kuppusamy's scale, Part III: consists of obstetrical data, such as gestation in weeks, parity, hemoglobin on admission, duration of third stage of labor in minutes.

Section B

Checklist consists of 3 parts. Part I: Total Vaginal blood loss in the mother for first two hours immediately after normal vaginal delivery among the experimental and the control group. Part II: Physiological variables (respiration rate, pulse rate, blood pressure and SPO2) among the experimental and control group. Part III: hemoglobin level on admission and 24 hrs after the delivery. Parameters in the tool were assessed by observation method with the help of checklist and scored quantitatively. The content of the instrument was evaluated by 7 experts from the field of Obstetrics and Gynecology Nursing department. The reliability of the tool was checked by using inter- rater reliability method and the tool was found to be reliable (r =0.9). Permission was obtained from the concerned authority of the Hospital. The subjects were selected based on the inclusion and exclusion criteria for the study. Written consent was taken from each subject before the intervention. Confidentiality and anonymity were assured.

After getting formal and ethical clearance, the researcher conducted the study. For this the data collection was done in the labor room and in the postnatal ward. In labor room to estimate the volume of vaginal blood loss and to monitor and record baseline variables during the first two hours after the normal vaginal delivery. There after data collection also carried out in the postnatal ward after 24 hrs of birth to estimate the mother's hemoglobin level in the study and control group. Before starting data collection the mothers were selected randomly based on the inclusion criteria. Informed consents were obtained from the mother for study. Then the oxygen will be administered for the experimental group mothers for the purpose of the study and control group mothers received the routine care from the Hospital. Data was collected in the three different phases: Phase I: The volume of blood loss measured by using Kelly's pad while mother on delivery table and followed with vaginal sanitary pad for total 2 hrs. The quantity of blood (ml) = (weight of used materials - weight of materials prior to use)/ deviation range. Phase II: Respiratory rate, pulse rate, systolic and diastolic blood pressure, SPO2 during intervention period in experimental and control group. Phase III: Hemoglobin concentration estimated on admission and 24 hrs after delivery. Data analysis enables the researcher to organize, summarize, evaluate, interpret & communicate numerical information. Organize the data in master sheet & proceeded for analyses. Descriptive statistics like frequency, percentage distribution are used to analyses the demographic and obstetrical variables. Mean and standard deviation were used to analyses the vaginal blood loss and the Physiological variables of the experimental and control group. Unpaired t test will be used to compare the amount of blood loss between the two groups. Correlation of coefficient are used to correlate amount of vaginal blood loss and the duration of third stage of labor. chi square test are used to associate the vaginal blood loss with the selected demographic and obstetrical variables.

Result and Findings

Distribution of the Demographic Variable regarding age of the subjects exhibits that the majority 20 (80%) subjects in the control and 22 (88%) subjects in the experimental group falls under the age group of 21- 29years, about 4 (16%) & 2 (8%) subjects of the control and the experimental

group were under ≤ 20 years of age. Only 1 (4%) subject of control and experimental group belong to ≥ 30 years of age. Regarding Height and Weight of the subjects data presented that majority 24 (96%) subjects in the control and 24 (96%) subjects in the experimental group falls under the height of 146cm and above, and only 1(4%) subject of the control and the experimental group were under ≤ 145 cm and majority 20 (80%) subjects in the control and 17 (68%) subjects in the experimental group falls under the weight 46- 60kg, about 3 (12%) & 4 (16%) subjects of the control and the experimental group were above 60kg. Only 2 (8%) & 4 (16%) subjects of the control and experimental group belong to ≤45 kg. in relation to economic status of the subjects it showed that majority 15 (60%) subjects in the control and 17 (68%) subjects in the experimental group falls under the upper lower (IV) class, about 10 (40%) & 8 (32%) subjects of the control and the experimental group were under lower middle (III) class.

Distribution% of obstetrical variables of subjects exhibits that exhibits that all subjects i.e 25 (100%) subjects in the control and 25 (100%) subjects in the experimental group fall under the gestational age 38-40wks and 14 (56%) subjects in the control and 11 (44%) subjects in the experimental group falls under 1- 4 parity, 11(44%) & 14 (56%) subjects of the control and the experimental group were primi. With regard to type of labour it represented that majority 19 (76%) subjects in the control and 16 (64%) subjects in the experimental group undergone Induced labor and about 6 (24%) & 9 (36%) subjects of the control and the experimental group had a natural labor. **%** In relation to haemoglobin level it exhibits that the majority 23 (92%) subjects in the control and 24 (96%) subjects in the experimental group falls under the hemoglobin level 11- 13gm, and about 2 (8%) & 1 (4%) subjects of the control and the experimental group were above 13gm. And none of the subjects in the control and experimental group were below 10gm.

With regard to the amount of blood loss data highlights that the mean vaginal blood loss at the end of first hour in the control group was 259.6 ml ± 52.34 and 228.2 ml ± 30.88 in the experimental group and the mean vaginal blood loss at the end of second hour in the control group was 136.08 ml ± 25.56 and 84.6 ml ± 15.54 in the experimental group (Table 1).

Study Groups	Mean vaginal blood loss in ml at the end of first hours	Mean Difference	Standard Deviation
Control Group	259.60ml	31.40ml	52.342.
Experimental Group	228.20ml		30.88
Study Groups	**Mean vaginal blood loss in ml at the end of Second hours**	**Mean Difference**	**Standard Deviation**
Control Group	136.08ml	51.48ml	25.56
Experimental Group	84.60ml		15.54

Table 1: Amount of Blood Loss after first hour and second hours of Delivery.

With regard to Physiological Variables data revealed that the mean respiration rate of the subjects in the control and experimental group at the end of first hour were 35.68/min ± 2.86 and 30.88/min ±3.6. At the end of second hour were 30.48/min±2.33 and 25.76/min± 1.56. The mean pulse rate of the subjects in the control and experimental group at the end of first hour were 109.12/min ± 11.46 and 97.68/min ±10.87. At the end of second hour were 91.52/min±4.9 and 81.28/min± 4.72. The mean systolic blood pressure of the subjects in the control and experimental group at the end of first hour were 100.8mm of hg± 6.72 and 105mm of hg ± 5.2. At the end of second hour were 101mm of hg ±4.7 and 113mm of hg ± 4.08. The mean Spo2 of the subjects in the control and experimental group at the end of first hour were 94.44 ± 4.16 and 97.08 ± 2.93.At the end of second hour were 96.08 ± 2.9 and 99.6 ± 0.7.

The mean hemoglobin of the subjects in the control and experimental group on admission were 11.34 ± 0.8 and 11.6 ± 0.93. And after 24hrs of delivery were 10.12 ± 0.95 and 11.46 ± 0.95. a) ≤ Regarding Effectiveness of the oxygen inhalation on vaginal blood loss among the control and experimental group highlights that the mean vaginal blood loss at the end of first hour was 259.6ml ± 52.34 and 228.2ml ± 30.88 for the control and experimental group respectively, the calculated't' value is 2.31 shows the 'p' value 0.029 was statistically significant through the mean vaginal blood loss at the end of first hour of the control and the experimental group. The mean vaginal blood loss at the end of second hour was 136.08ml ± 25.56 and 84.6ml ± 15.54 for the control and experimental group respectively, the calculated 't' value is 9.45 shows the 'p' value 0.000* was statistically significant. Therefore it was inferred that there is a positive effect of oxygen inhalation on vaginal blood loss among the mothers

in the third and fourth stage of labor in the experimental group (Table 2).

Vaginal blood loss among the study group	Mean	SD	't' Value	Level of significance 'p' value
Vaginal blood loss (1st hr) control group	259.6ml	52.34	2.31	0.029
Vaginal blood loss (1st hr) experimental group	228.2ml	30.88		
Vaginal blood loss (2nd hr) control group	136.08ml	25.56	9.45	0.000*
Vaginal blood loss (2nd hr) experimental group	84.6ml	15.54		

Table 2: Effectiveness of Oxygen Inhalation on Blood Loss.

Further regarding correlation between the amount of blood loss and duration of labour it highlighted that there is a positive correlation between the vaginal blood loss and the duration of third stage of labor score r=0.482, indicates there is reduction of vaginal blood loss according to the duration of third stage of labor & vice versa in the experimental group. In relation to the association it showed that none of the demographic and obstetrical variables found statistically significant association to the amount of bleeding, indicated the intervention i.e Oxygen inhalation can be given to all mothers in-order to control blood loss and there by reduction of 3rd and fourth stage of labour.

Discussion

The present study result showed that in the experimental group i.e those mothers were given oxygen inhalation after delivery of the baby they had demonstrated that less blood loss compare to the control group mothers, those who were inhaled room air as conventional measures. The mean vaginal blood loss at the end of first hour in the control group was 259.6 ml ± 52.34 and 228.2 ml ± 30.88 in the experimental group and the mean vaginal blood loss at the end of second hour in the control group was 136.08 ml ± 25.56 and 84.6 ml ± 15.54 in the experimental group with the mean difference of 31.4 ml and 51.48 ml respectively. This result supported by the author Sekhavat L, et al. [12] conducted a prospective randomized study on 104 primiparas divided into the study group (O2 inhalation group), 52 women, received 8 l/min oxygen via a facemask for 2 hrs after the third stage of labor, whereas the control group, 52 women breathed room air in addition to conventional management.

All women were evaluated hourly for vaginal blood loss. Blood loss volume was measured from the end of placenta delivery to 2 h postpartum and compared between the two groups. The mean vaginal blood loss 2 h postpartum was 27.7 +/- 5.8 ml in O2 inhalation group and 48.8 +/- 8.4 ml in the controls ($P < 0.05$). Thus the author concluded that postpartum oxygen inhalation appears to reduce blood loss after normal vaginal delivery. Further the present result also supported by Asanga B Yatawatta [1] conducted a study to find out the effect of oxygen inhalation immediately after normal delivery on blood loss among twenty one women in the oxygen inhalation group receive 40% oxygen via a facemask for 6 hours after the third stage of labor and 19 in the room air inhalation group. Mean vaginal blood loss during the 1st hour was 32.4±34.1mL in controls and 16.9±19.1mL in study group receiving oxygen (P=0.05). The mean hourly vaginal blood loss gradually declined in both the groups and was 12.0±8.4mL in the controls and 7.2±3.8mL in the study group (P=0.01) during the 6th hour. Thus the results reveal that Oxygen inhalation immediately after third stage of labor appears to reduce blood loss after normal vaginal delivery.

Recommendation

Replication of the study may be done with the larger samples in different setting to validate and generalize the findings. The findings can be used as evidence based for providing oxygen therapy for all mothers who undergo vaginal delivery to prevent incident of PPH, and postpartum anemia. Conflict of Interest- There is no conflict of interest for this article and its self funded.

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