



**ORIGINAL RESEARCH PAPER**

**Obstetrics & Gynaecology**

**ASCORBIC ACID CONCENTRATION IN PPROM AND ITS MATERNAL AND PERINATAL OUTCOME.**

**KEY WORDS:**

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**ABSTRACT**

**BACKGROUND** Preterm prelabour rupture of membranes is the spontaneous rupture of fetal membranes before 37 completed weeks of gestation and before onset of labour. It complicates approximately 1-5 % of all pregnancies and contributes to one- third of preterm births. The biochemical mechanism in membrane rupture is disturbances in collagen structure and formation and increased oxidative stress. Vitamin C deficiency during pregnancy leads to abnormal collagen formation leading to preterm, prelabour rupture of membranes and complications.

This study was undertaken to establish the relation between maternal plasma vitamin C concentration in women with PPROM and women without PPROM and to correlate the neonatal morbidity, mortality and maternal morbidity due to it.

**OBJECTIVES**

1. Establish the association between maternal plasma vitamin C concentration in women with PPROM and women without PPROM.
2. Study the difference in maternal and perinatal morbidity and mortality in both the groups

**METHODS** This case control study was conducted in Department of obstetrics and gynaecology, Narayana Medical College & Hospital ,Nellore. 100 patients were studied , 50 were in study group ( patients admitted to labour room with pprom) and 50 in control group (patients admitted to labour room at term for delivery). Fasting blood sample was taken to measure the plasma vitamin C levels in both groups.

**RESULTS** Plasma vitamin C levels were low in PPROM patients and the concentration decreased as the pregnancy advanced, this proves linear relationship between plasma vitamin C levels and PPROM. The results of this study showed decreased plasma vitamin C levels leading to PPROM, preterm deliveries, increased NICU admissions, increased perinatal morbidity, mortality, in study group than in control group.

**CONCLUSION** As vitamin C deficiency during pregnancy leads to PPROM, it's supplementation during pregnancy along with iron and calcium in second and third trimester should be made mandatory.

**INTRODUCTION:**

Preterm prelabour rupture of membranes is the spontaneous rupture of fetal membranes before 37 completed weeks of gestation and before the onset of true labour. It is considered as one of the major factors responsible for neonatal morbidity and mortality. It complicates approximately 1-5 % of pregnancies and contributes to one- third of preterm births.

The risk of infection increases once the membranes have ruptured. The main biochemical mechanism in membrane rupture is disturbances in collagen metabolism. Vitamin C is water soluble micro nutrient involved in the collagen synthesis. It acts as an enzyme cofactor to the enzymes lysyl hydroxylase and prolyl hydroxylase, which are required for the synthesis of hydroxylysine and hydroxyproline during hydroxylation of collagen. Collagen requires hydroxylysine and hydroxyproline bridges across the triple helix to provide stability to it. Vitamin C also down regulates metalloproteinase-2 and collagenase, which hamper the collagen production. It also acts as an antioxidant which blocks the damaging effects of oxidative stress. It has been shown by cell culture studies that the synthesis and deposition of the amniochorionic matrix is dependant on the presence of vitamin C. Hence vitamin C deficiency during pregnancy leads to abnormal collagen formation which is unable to provide the mechanical strength and ruptures the membranes prematurely. Hence leading to preterm prelabour rupture of membranes and its associated devastating complications.

**Normal Levels Of Vitamin C**

The normal concentration of vitamin C is 0.6-2.0 mg/dl. Vitamin C in a dose of 100mg/day is sufficient to maintain the plasma concentration at 0.6-2.0 mg/dl and prevent PPROM.

**Relationship Of Vitamin C And Pregnancy**

The plasma concentration of the plasma vitamin C declines as the pregnancy advances, due to combined effect of reduced dietary intake, increased oxidative stress of pregnancy,

relative hemodilution. The deficiency of vitamin C in pregnancy leads to increased risk of infection, pre eclampsia, preterm premature rupture of membranes and preterm birth. The present study was undertaken to establish the relationship between maternal plasma vitamin C concentration in women with PPROM and women without PPROM and to correlate the neonatal morbidity, mortality and maternal morbidity due to it.

**MATERIALS AND METHODS**

The proposed study was conducted in Department of Obstetrics and Gynecology, Narayana Medical College, Nellore.

Hospital based case control study was conducted on 100 patients, 50 were in the study group (patients admitted to labour room with h/o PPROM) and 50 in the control group (patients admitted to labour room at term for delivery)

**Duration of the study-** 18 months from December 2019 to May 2021

**Inclusion Criteria**

Women with h/o PPROM, who are willing to participate in the study and have given consent for the study.

**Exclusion Criteria:**

- Women with
1. Gestational Diabetes Mellitus
  2. UTI
  3. RTI
  4. Vaginal infection
  5. Polyhydramnios
  6. Smoker
  7. Evidence of chorioamnionitis in present pregnancy

**Procedure Of The Study**

All subjects fulfilling the eligibility criteria were counselled

and an informed consent was taken (in the language understood by the patient and attender). All the women then underwent a detailed history and clinical examination. On admission, the study women were started on prophylactic antibiotics as per hospital protocol. Fasting blood samples were taken for the estimation of plasma vitamin C concentration.

**Plasma ascorbic acid**

Plasma Ascorbic acid: Maternal 2 ml of fasting venous blood samples were collected in plain vial to estimate ascorbic acid. Ascorbic acid is estimated in plasma by spectrophotometry method. Normal level of ascorbic acid is 0.6-1.2 mg/dl.

Mode of delivery and maternal and fetal outcomes were noted.

All the data was entered into a predesigned case proforma during the study.

**RESULTS**

This case control study was conducted on 100 patients admitted in the Department of Obstetrics and Gynecology, Narayana Medical College, Nellore, from December 2019 to May 2021.

**Age Distribution**

Age	Study Group		Control Group		Total
	No of cases	Percent	No of cases	Percent	
18-20	5	10	5	10	10
21-25	17	34	18	36	35
26-30	26	52	23	46	49
30-40	2	4	4	8	6
Total	50	100	50	100	100

There is no statistically significant difference in the age distribution among both groups.

**Gravida Score:**

Gravida	Study Group		Control Group		Total
	No of cases	Percent	No of cases	Percent	
Primigravida	22	44	25	50	47
Multigravida	28	56	25	50	53
Total	50	100	50	100	100

44% of cases in study group and 50% of cases in control group were primi gravidae. 56% of cases in study group and 50% of cases in control group were multigravidas.

There was no statistically significant difference in parity among both groups.

**Duration Of Rupture Of Membranes:**

DURATION OF ROM	STUDY GROUP
<6 HRS	3 (6%)
6-12 HRS	17(34%)
12-24 HRS	12(24%)
24-48 HRS	12(24%)
48 HRS	6(12%)
TOTAL	50

Majority of them reported with in 6-12 hrs of rupture of membranes.

**Plasma Vitamin C Levels:**

Plasma vitamin C(mg/dl)	Study Group		Control Group		Total
	No of cases	Percent	No of cases	Percent	
< 0.6	25	50	9	18	34
0.6 - 2.0	25	50	36	72	61

> 2.0	0	0	5	10	5
Total	50	100	50	100	100

In the study group, out of 50 cases, plasma vitamin C levels less than 0.6 mg/dl was seen in 25 cases (50%) and in the range of 0.6-2.0 mg/dl in 25 cases (50%).

In the control group, out of 50 cases, plasma vitamin C levels than 0.6 mg/dl was seen in 9 cases (18%), 0.6-2.0 mg/dl in 36 cases (72%) and more than 2.0 mg/dl in 5 cases (10%), highly significant.

**Plasma Vitamin C Levels In Relation To Gestational Age In Study Group:**

Plasma vitamin C(mg/dl)	Gestational age(wks)			Total
	28 - 32	32 - 34	34-36	
<0.6	6	9	10	25
0.6 - 2.0	9	3	13	25
Total	15	12	23	50

In the study group, the plasma vitamin C levels in very early preterm pregnancy was <0.6 mg/dl in 6 cases and 0.6-2.0 mg/dl in 9 cases. In early preterm pregnancy, the levels were <0.6 mg/dl in 9 cases, 0.6-2.0 mg/dl in 3 cases. In late preterm pregnancy, the levels were < 0.6 mg/dl in 10 cases and 0.6-2.0 mg/dl in 13 cases.

**Maternal And Fetal Outcome In Both Groups**

	STUDY GROUP	CONTROL GROUP
MODE OF DELIVERY LSCS	30 (60%)	12 (24%)
NVD	20 (40%)	38 (76%)
NICU ADMISSIONS	35 (70%)	6 (12%)
MEAN NICU STAY	10±4.6	5.6±3.3
EARLY NEONATAL DEATH	12 (24%)	5 (10%)

There was a significant difference in the mode of deliveries, and 60% of women underwent LSCS in the study group VS 24 % in the control group. NICU stay beyond 24 h was 70 % versus 12 % in the study and control groups, respectively. Early neonatal deaths were more in the study group 24 % probably due to prematurity and low birth weight.

**DISCUSSION:**

The present study was conducted in the Department of Obstetrics and Gynecology, Narayana Medical College , Nellore during the period of December 2019 to May 2021. A total of 100 patients were included in the study, 50 cases being in the study group with history of PPRM and 50 cases in control group without PPRM.

In this study, there is no statistically significant difference in the age distribution among both groups. There is no statistically significant difference in parity among both groups. Majority of them reported with in 6-12 hrs of rupture of membranes.

In the study group, out of 50 cases, plasma vitamin C levels less than 0.6 mg/dl was seen in 25 cases (50%) and in the range of 0.6-2.0 mg/dl in 25 cases (50%). Ascorbic acid concentration decreases with increasing gestational age. JA Osaikhuwuomwan et al and Esther Casanueva et al demonstrated that plasma vitamin C levels decreased as the pregnancy advanced.

There was a significant difference in the mode of deliveries, and 60% of women underwent LSCS in the study group VS 24 % in the control group. NICU stay beyond 24 h was 70 % versus 12 % in the study and control groups, respectively. Early neonatal deaths were more in the study group 24 % probably due to prematurity and low birth weight.

Plasma vitamin C levels were low in PPRM patients and the concentration decreased as the pregnancy advanced, this proves linear relationship between plasma vitamin C levels and PPRM. The results of this study showed decreased

plasma vitamin C levels leading to PPROM, preterm deliveries, increased NICU admissions, increased perinatal morbidity, mortality, in study group than in control group.

**CONCLUSION:**

In this study, plasma vitamin C levels were low in PPROM patients and the concentration decreased as the pregnancy advanced, this proves the linear relationship between plasma vitamin C levels and occurrence of PPROM. The results of this study showed decreased plasma vitamin C levels leading to the PPROM and preterm deliveries, increased NICU admissions, increased perinatal morbidity, mortality, The daily intake of vitamin C in food is very small 40- 50 mg/day. The need for vitamin C in pregnancy is increased due to increased oxidative stress, decreased dietary intake, hemodilution. Improvement in the dietary habits and nutritional status of pregnant women helps in reducing PPROM. Vitamin C supplementation in the dietary dose (100 mg/day) should be made mandatory along with iron and calcium to all antenatal women in second and third trimester to avoid the devastating and preventable complications of PPROM.

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