

EFFECTIVENESS OF VITAMIN C IN PREVENTING PRE-LABOUR RUPTURE OF CHORIO-AMNIOTIC MEMBRANES IN PREGNANCY IN WOMEN HAVING HISTORY OF PROM IN PREVIOUS PREGNANCIES

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ABSTRACT

Objective: To determine the effectiveness of vitamin C supplementation in preventing pre-labour rupture of chorio-amniotic membranes (PROM) in pregnancy in women having history of PROM in previous pregnancies.

Methodology: This descriptive study was carried out in Department of Obstetrics and Gynaecology, Khyber Teaching Hospital, Peshawar from August 2013 to January 2014. Cases with history of PROM in previous pregnancies were included in this study. Vitamin C supplementation in preventing PROM was used in these patients. All pregnant patients presented from 22 to 28 weeks gestation received a daily dose of Vitamin C 500mg. PROM at the end of pregnancy was noted.

Results: Out of 133 patients who received Vitamin C, 98 (74%) didn't experienced PROM and 35 (26%) had PROM, showing the effectiveness of Vitamin C in preventing PROM which is effective in 74%.

Conclusion: In our study Vitamin C was proved to be helpful in preventing PROM and it is suggested that patients with previous history of PROM should be given vitamin C supplementation.

Key Words: Vitamin C, Chorioamniotic membrane, Pregnancy

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INTRODUCTION

Pre-labour rupture of fetal membranes (PROM) is a common clinical problem. Approximately 8% of all pregnancies are complicated by PROM at term^{1,2}. It is defined as rupture of fetal membranes at or beyond 37 weeks of gestation in the absence of spontaneous uterine activity. Following rupture of membranes the mechanical protective barrier that isolates the fetus within the intra amniotic cavity is lost. This exposes the mother and fetus to increased risk of infectious morbidity due to ascending infections from cervix and vagina. Risks to the mother include Chorioamnionitis in the antenatal or intra-partum period and postpartum hemorrhage and endometritis in the postnatal period. Risk to the fetus are fetal distress due to cord compression associated with oligohydramnios and neonatal sepsis later on³. The risk of fetal and maternal infection is known to be increased with increasing duration between membrane rupture and delivery.

Management options for term pre labour rupture of membranes include either expectant management or

planned early birth by induction of labour. Surprisingly there is controversy about whether it is best to induce labour or to wait for spontaneous labour in the absence of fetal and maternal compromise⁵.

There is diversity in current clinical practice and uncertainty about appropriate management. Time period for expectant management can vary between 12 –72 hours and even up to 4 days but studies have shown that waiting for long have no added benefits⁶. A period of 24–48 hours is acceptable. Conservative approach has been favored by some studies due to evidence that 80% of patients go into spontaneous labour within 24 hours. The rate of cesarean section and instrumental vaginal delivery is also less with this approach without a significant increase in risk of infection^{7,8}. On the other hand some studies associate expectant management with increased risk of maternal and neonatal infections⁵.

Induction in pre labour rupture of membranes could be done both with Prostaglandin and Oxytocin⁹. Early induction has been considered preferable by some obstetrician due to association with a low risk of maternal

and fetal sepsis, a high maternal satisfaction rate, short delivery interval and hospital stay, without an increase in caesarian section rate^{5,10,11}. On the contrary others believe it to be responsible for higher rates of operative deliveries and maternal and fetal morbidity associated with it. This is especially so in women with poor bishop⁵. There are studies which advocate both management options being equally reasonable choices⁹.

The aim of our study was to prevent PROM by supplementing Vitamin C which is safe and cost effective in preventing PROM and its adverse consequences.

METHODOLOGY

This descriptive study was conducted at Department of Obstetrics and Gynaecology, Khyber Teaching Hospital, Peshawar from August 2013 to January 2014. All Women seeking antenatal care at 20 to 28 weeks gestation with singleton pregnancy presenting in the outpatient department of Khyber Teaching Hospital, Peshawar with history of PROM in previous pregnancies (from 20 weeks till term) were enrolled in this study and were evaluated in terms of frequency of PROM at the end of pregnancy. Sampling technique was convenient sampling. All included women have received folic acid, iron supplements along with chewing tablets of vitamin C (500 mg) per day from 20 to 28 weeks gestation and continued till 37 weeks. An informed consent was taken for participation in this study. In each antenatal visit all these women were evaluated for genitourinary infection. Any symptomatic patient had her pelvic examination and high vaginal swabs taken and treated accordingly. These women were provided charts for a daily record of intake of vitamin C supplements.

Inclusion criteria included mothers of age 18-35 years

with history of at least one PPRM in previous pregnancies, singleton pregnancy, body mass index (BMI) of 18.5-30 kg/m², normal fetus and normal amniotic fluid in sonography, normal cervix length (more than 25mm) and no Tobacco usage. It was also ascertained that they have not been consuming vitamin C supplements.

Multigravida patients having history of PROM in more than two previous pregnancies were included but can be taken as confounding factor.

Data was entered in SPSS version 11.0. Mean and standard deviations were calculated for age and period of gestation. For gravidity and parity, frequency and percentages were computed. PROM was stratified among age, parity and period of gestation to see the effect of modifiers.

RESULTS

The mean age of the sample was 33±1.26 years. There were highest 53(40%) number of patients in 31-35 years age group. Majority were multigravida i.e., 93 (70%) patients. The period of gestation among these patients was mostly between 37-40 weeks, i.e., 117 (88%). The demographic details are expressed in Table 1.

The detail of the stratification of Vitamin C with age, gravidity and period of gestation is described in Table 2.

In this study, 98 (74%) patients had no PROM while 35 (26%) patients experienced PROM, showing that Vitamin C was 74% effective in prevention of PROM. A cervico-vaginal infection, which was treated, was present in 18 (13.5%) of the 133 patients at the first evaluation at 20 week of pregnancy. The most frequently isolated microorganisms were *C. albicans* and *G. vaginalis* in 9.5% and 3.3% of the cases, respectively.

Table 1: Demographic details of the sample

Demographic Variables		Number	Percentage
Age (in years)	20-25	33	25%
	26-30	47	35%
	31-35	53	40%
Gravidity	Multigravida	93	70%
	Grand multigravida	40	30%
Period of Gestation (in weeks)	37-38	57	43%
	39-40	60	45%
	>40	16	12%
Total		133	100%

Table 2: Effectiveness of Vitamin C

Effectiveness of Vitamin C		Yes	No	p value
Age (in years)	20-25	25	8	0.931
	26-30	35	12	
	31-35	38	15	
Gravidity	Multigravida	73	20	0.630
	Grand multigravida	25	15	
Period of Gestation (in weeks)	37-38	44	13	0.742
	39-40	45	15	
	>40	9	7	
Total		98	35	

DISCUSSION

There can be many factors that can cause alteration in the availability of Vitamin C during pregnancy and adjusting the current recommendations of dietary allowance may be required. We assessed Vitamin C status by its supplementation (500 mg /day) to pregnant women from 20-28 weeks period of gestation. In one study plasma concentration of vitamin C was not different between the two groups, one with Vitamin C (control) and other without vitamin C (placebo). It may be due to the fact that the range of dietary Vitamin C intake is very small (40 – 230 mg Vitamin C /day) and the authors explored vitamin C intake from 0 to 2500 mg/d^{12,13}. In contrast, leukocyte concentration which is considered as an indicator of the stored amount of vitamin C was increased in the vitamin C group but decreased in the placebo group¹⁴.

Due to hemodilution and active transport of Vitamin C to the fetus plasma (which increases throughout pregnancy), Vitamin C concentration decreases progressively during pregnancy regardless of supplementation^{15,16}. Thus, leukocyte Vitamin C concentration might be considered as a direct marker of compliance.

Another study found an inverse relation between Vitamin C intake and the incidence of PROM¹⁷. Vitamin C in large doses can cause adverse reactions, like oxidative stress. Reactive oxygen species can enhance collagen degradation in chorio-amniotic membranes, which can interfere with the protective effect on gene expression of metalloproteinase's (MMP -2) and can lead to increased collagen degradation. This is thought to be an important mechanism in the genesis of PROM^{18,19}. This potential undesirable effect must be taken into account when establishing the supplementation of Vitamin C and it is proposed that Vitamin C should serve as

a functional indicator of PROM.

No relationship was found between PROM and infection although there was cervico-vaginal infection by 28 weeks gestation in 38% women. Those infections were treated and no infection relapses were found in those women^{18,19}.

Preterm premature rupture of the membranes (PPROM) has been known as the major cause of preterm delivery, neonatal and maternal morbidity and mortality^{14,18}. Simhanet et al in their study have reported that the level of vitamin C is decreased in women with PROM¹⁶. The results of this study show that Vitamin C use in these group significantly increased the gestational age at delivery, neonatal Apgar score, birth weight and latency period. This finding was confirmed by the study of Barret et al, who concluded that administration of Vitamin C 100 mg in pregnant women after 20th week of gestation can significantly decrease the incidence of PROM and PPROM²⁰. Siega et al showed that the rates of membrane rupture before 37 weeks is increased with decrease in Vitamin C supplements, although the relationship was not statistically significant²¹. In addition, Haji foghaha et al reported that the usage of Vitamin C supplements after the 20th week of gestation prevents PPROM²².

Since the isolation of the effect of single nutrient is difficult when the serum Vitamin C level is not assayed, we could not study the independent effect of vitamin C. Further studies with larger sample size to clarify the role of vitamin C in prevention of PROM are needed especially in women with other risk factors.

CONCLUSION

Our data supports that Vitamin C may prove to be helpful in preventing PROM. However, more robust

trials in our population may be needed to confirm our results. It is suggested that the goal should be achieved through consumption of natural fruits and vegetables.

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CONTRIBUTORS

FR conceived the idea, did data collection and wrote the manuscript. AM and MM helped in data collection and writing up of manuscript. TJ supervised the study. All authors contributed significantly to the final manuscript.