ORIGINAL ARTICLE

ROLE OF VITAMIN C SUPPLEMENTATION IN PREVENTION OF PRE LABOUR SPONTANEOUS RUPTURE OF CHORIOAMNIOTIC MEMBRANES

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ABSTRACT

BACKGROUND: Prelabour rupture of membranes means the rupture of chorioamniotic membranes at least one hour prior to the initiation of labour after thirty seven completed weeks of gestation and when it occurs before term that is thirty seven weeks of gestation, it is called preterm prelabour rupture of membranes. This study was conducted to know the role of Vitamin C supplementation in preventing pre labour spontaneous rupture of chorioamniotic membranes in pregnancy.

METHODS: This Randomized controlled trial was conducted at Mother and Child Health Unit II, Pakistan Institute of Medical Sciences Islamabad, from May to November 2009. 200 pregnant women,12-20 weeks of gestation, with singleton pregnancy were included excluding non compliant women, those with cervical circlage, having obstetric indication for cesarean section or active smokers were sampled through non-probability convenient sampling. Then they were randomly assigned to two groups; both groups received Folic acid and Iron supplements. Group 1 was study group and was supplemented with Vitamin C 500mg/ day while Group 2 was control group which didn't receive Vitamin C. An informed consent was taken. Data was analysed using SPSS version 11 and Chi sq test was applied for comparison at 5% level of significance.

RESULTS: Mean age of all participants was 25.5 + 4.8 years .Association between prevention of pre labour spontaneous rupture of chorioamniotic membranes and supplementation of Vit C was found non-significant.

CONCLUSION: Antioxidants like Vitamin C may not be helpful in preventing rupture of membranes at this gestation and dosage and more work needs to be done.

KEY WORDS: PROM, PPROM, Vitamin C, Chorioamnionitis.

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INTRODUCTION

Prelabour rupture of membranes (PROM) means the rupture of chorioamniotic membranes at least one hour prior to the initiation of labour after thirty seven completed weeks of gestation and when it occurs before term that is thirty seven weeks of gestation, it is called preterm prelabour rupture of membranes (PPROM)[1]. PPROM is associated with one third of the premature deliveries, which is a major problem of not just the developing countries but also of the developed countries and it occurs in about 3% of pregnancies[2]. In Pakistan, the reported frequency of PPROM is 16%[3]. In the United States, it affects 120,000 pregnancies each year [1] while in China, incidence of PROM is 19.53%.[4] Risk factors associated with the risk of PPROM or PROM include race[5], ethnicity, parity, excessive membrane degradation (or decreased collagen content)[1], cervical incompetence[6], tobacco smoke[7] and subclinical intrauterine infection. Subclinical intrauterine infections is considered as the most important factor in the pathogenesis of PPROM.[8]

The diagnosis of PPROM is made by a combination of clinical suspicion, history of patient and some simple tests. Significant maternal and neonatal morbidity and mortality is associated with PPROM. Neonatal complications include infection, umbilical cord compression, placental abruption and preterm birth. The frequency of positive cultures obtained by transabdominal amniocentesis at the time of presentation with PPROM is 25–40%. The classical signs and symptoms of amniotic fluid infection in the setting of PPROM are not produced and therefore can not be used as diagnostic criteria for clinical chorioamnionitis. Any evidence of infection on amniocentesis should be considered carefully as it is an indication for delivery. Documentation of amniotic fluid infection with PPROM enables us in making therapeutic decision rationally. The risks associated with prolonging pregnancy are infection, abruption and cord accident. Assessment of Lung maturity may be helpful when planning delivery in the 32- to 34-week interval.

It is important that gestational age be kept in mind while managing a case of PPROM. It needs adjustments according to the hospital's neonatal

intensive care unit capacity. Antenatal antibiotics and corticosteroid therapies have clear benefits in PPROM and should be offered to all women without contraindications. During conservative management, women should be closely monitored for placental abruption, infection, labour and a non-reassuring fetal status. Delivery should be considered for women with PPROM after 32 weeks of gestation and after 34 weeks the benefits of delivery clearly outweigh the risks.[1]

Tocolysis is an option in case of preterm labour but to use it in cases of PPROM, it increases the chances of the respiratory distress syndrome. A latency of >1 week can be achieved by aggressive post-PPROM tocolysis but it neither provides the advantages of extended gestational age nor decreases predischarge neonatal morbidity. These findings are important for the clinical management of PPROM.[9] Intentional delivery may be favorable to expectant management in terms of some maternal outcomes. There is insufficient evidence to suggest that either strategy affects the newborn.[10] Although there is proven benefit of induction of labour in selected cases, its impact on increasing the rates of operative delivery should be kept in mind.

Keeping in view all the effects of PPROM on the mother and the neonate, it will be of utmost importance to reduce the burden of PPROM and PROM. One of the proposed strategies is to use vitamin C as an antioxidant to reduce PPROM.[11] If it could effectively bring down the incidence of preterm births, which in turn would reduce the burden on the neonatal intensive care units. Antenatal accidents like placental abruption, infection, sepsis would also be reduced.

When conservative management of PPROM is decided, antenatal fetal surveillance is recommended. The testing modalities commonly used are the non-stress test and the biophysical profile. The goal of testing is to predict adverse fetal outcome that may result in fetal compromise i.e. umbilical cord compression (secondary to oligohydramnios or anhydramnios) and chorioamnionitis. Healthcare cost significantly rises by prolonging stay in the hospital for the mother, the frequent tests that are being carried out and the NICU costs.[1] This study was conducted to know the role of Vitamin C supplementation in preventing prelabour spontaneous rupture of chorioamniotic membranes in pregnancy.

MATERIAL & METHODS

This Randomized controlled trial was conducted at Mother and Child Health Unit II, Pakistan Institute of Medical Sciences Islamabad, from From May to November 200 pregnant women,12-20 weeks of gestation, with singleton pregnancy were included excluding non compliant women, those with cervical circlage, having obstetric indication for cesarean section or active smokers were sampled through non-probability convenient sampling ,matched for their age, height, weight. Then they were randomly assigned to two groups ;both groups received Folic acid and Iron supplements. Group 1 was study group and was supplemented with Vitamin C 500mg/ day while Group 2 was control group which didn't receive Vitamin C. An informed consent was taken. It was hypothesized that supplementation with Vitamin C 500 mg per day at 12-20 weeks gestation decreases the frequency of spontaneous rupture of the chorioamniotic membranes in women as compared to controls. Risks of vitamin C toxicity i.e. gastric irritation, flatulence, diarrhea, oxalate kidney stones (theoretically) and the benefits i.e. its action as an antioxidant, role in collagen synthesis, absorption of non haem iron, wound healing and drug metabolism were explained. All participants were provided a chart for a daily record of the intake of supplements i.e. for group 1, vitamin C with iron and folic acid supplements while for group 2 only iron and folic acid. At the end of pregnancy, the primary outcome was the frequency of PROM or PPROM in the two groups.

All these women included in this study had direct contact through telephone so that they reported as soon as they went into labour or if they had watery per vaginal discharge \ leaking (PROM\PPROM). A proforma was then filled for each of these women.

Data was analysed using SPSS version 11.0. Mean ± standard deviation (SD) was calculated for numerical variables.The incidence of PROM and PPROM was calculated as percentages. Using Chi square test inter-group comparison was done i.e. for PROM or PPROM between those who received Vitamin C and those who did not. P < 0.05 was taken as significant.

RESULTS

Mean age of all participants was 25.5 + 4.8 years . The mean gestational age at which women were booked in MCH center was 15 weeks. The mean gestational age at which vitamin C was started in the study group was 16weeks. Among the 100 women in the study group, 41 were primigravidas, 56 were multigravidas while 3 were grandmultis whereas in the control group, the numbers were 51, 48 and 1 respectively.9 women (4.5%) were lost to follow up. 5 from the study group and 4 from the control group.

TABLE 1: AGE(IN YEARS) OF THE PARTICIPANTS

GROUP	Mean	Std. Deviation	Minimum	Maximum
Control(n=100)	25.3700	4.77294	18.00	37.00
Study (n=100)	25.6300	4.92295	17.00	40.00
Total (n=200)	25.5000	4.83808	17.00	40.00

TABLE 2: PROM IN TWO GROUPS

	Yes	No	Lost to follow up	Total
Study Group	2	93	5	100
Controls	3	93	4	100
Total	5	186	9	200

P = 0.856

DISCUSSION

PROM and PPROM are important complications of pregnancy and it is associated with significant maternal and neonatal morbidity and mortality. In Pakistan the prevalence of PROM is reported to be 16%[3]. The incidence of PROM in our study is 17%. Similar figures were obtained from a study on Chinese population in Beijing over a five-year period[4].

The incidence of PPROM in our study was 2.5%. According to Hyagriv N Simhan and Timothy P Cannavan, PPROM occurs in 3% of pregnancies in the United States[1]. Similarly in a study conducted in Austria, PPROM complicated a similar percentage of pregnancies and is responsible for about one third of preterm births[12]. Jevon Plunkett et al in a study on the US population also quotes this figure of one-third preterm births[13].

Several demographic factors are considered to be related to PROM and PPROM. In our study, to match the two groups, all women enrolled were Asian in origin although several subgroups could be made to see if any particular group is more prone to this complication of pregnancy. There are racial effects on the occurrence and recurrence of PPROM for example the impact of being Punjabi, Pathan, Balochi or Sindhi or the difference in the urban and rural population. Its observed in the United States that black mothers are more likely to have ruptured membranes as compared to white women (95% CI 2-2.5) when all the known risk factors are adjusted[5]. Similarly Jewish ethnicity makes women prone to PROM and PPROM[6].

Age and parity are seen to be risk factors for PROM and PPROM, for example women less than 25 years of age14 and those with their first pregnancy (primigravidae)[1]. To avoid such bias, women were matched for their age, and parity. They were matched for their weight, height and therefore BMI in the two groups for the same reason.

The Centre for Preterm Birth Research states that the risk PPROM is greatest at gestational age < 28 weeks and so are the chances of recurrence[6]. In this study we recruited a limited number of women to see the effect of vitamin C on PPROM therefore the number of women with PPROM limits us from seeing the gestational age at which the risk of PPROM is highest.

Ruptured membranes is one of the common indication for induction of labour. It is considered as a factor responsible for increased cesarean section rate6 but in this study, the groups were made on the basis of Vitamin C and the difference in the mode of delivery between the two groups is not statistically significant. One of the reasons can be that most of these women went into labour spontaneously. The incidence of induction of labour in women with ruptured membranes should be studied along with its effect on the mode of delivery. Induction of labour may be due to maternal or fetal condition. According to a study, elective delivery in PPROM is associated with decreased neonatal morbidity as compared to spontaneous labour[15].

The diagnosis of PROM and PPROM was clinical and no tests were used to confirm it. We could use ultrasound[16] to support our diagnosis as an AFI of <10cm is the optimum cut off value to suspect PPROM[17]. Vitamin C is an antioxidant which is under study along with vitamin E in a number of conditions but its efficacy has not been proven so far. In some studies, Vitamin C and E are being used to see its effect in preventing preeclampsia in pregnant women at risk. The trial has failed to show any benefit of these antioxidant supplementation in women at risk[18]. But a trial conducted in Mexico demonstrated a statistically significant reduction in PROM and PPROM[19]. To see the effect of Vitamin C in our population, we conducted this trial. Our study showed contrary results. In a study by Spinnato JA 2nd et al in Cincinnati USA, the effect of daily use of Vitamin C 1000mg and Vitamin E 400iu was seen. Contrary to what was expected, Vitamin C and E in this dose combination is associated with an increased risk of PROM and PPROM. 11When these two Vitamins are given to women with PPROM between 26 and 34 weeks gestation, it is found that they increase the latency period before delivery.[20] Despite this statistical difference in the two groups, the increased latency period has no effect on clinical characteristics like chorioamnionitis, early neonatal sepsis and respiratory distress syndrome. According to a study conducted on animals in Pakistan, Vitamin C acts as a potent antioxidant and prevents teratogenic effects of oxidants.[21]

CONCLUSION

Antioxidants like Vitamin C may not be helpful in preventing rupture of membranes at this gestation and dosage but more work needs to be done. Randomized controlled trials with sufficient sample size are needed to be carried out on a larger scale to see the effect of antioxidants including Vit C.

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CONFLICT OF INTEREST

None declared.

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NIL

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.