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Original research article

A case-control investigation exploring the connection of urogenital infections as a risk factor for spontaneous premature labor

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Abstract

Background: Prematurity is defined as the state in which a fetus begins extra uterine life with biological immaturity. Maturation is described as the process of reaching the pinnacle of development or growth. The embryo and fetus develop intrauterine until their organ systems can support extra uterine life.

Methods: Case control study was conducted at the Department of Obstetrics and Gynecology, Kakatiya Medical College, Warangal, Telangana, India. Based on a case-control research on the relationship between genitourinary infection and premature labor from May 2021 to April 2022, the sample size was calculated.

Results: In my study, 25 women in the case group were between the ages of 21 and 30; there were no women under 21. Sixty percent of these women were primigravida, 36 percent were multiparous, and 4 percent had previously had abortions. 25 women made up the control group, 48 of whom were between the ages of 21 and 30. Only two of the 25 were under 21.

Conclusion: In my research, I discovered that people who had a high vaginal swab positivity had a notably greater rate of premature labor. In other words, preterm labor women experienced vaginal infection 2.80 times more frequently than women in the control group.

Keywords: Urogenital infections, risk factor, spontaneous premature labor

Introduction

Prematurity is the condition in which the fetus is biologically immature when it reaches the extra uterine life. The process of reaching full development or growth is known as maturation. When organ systems can support the additional uterine life, the embryo and fetus mature intrauterinally [1, 2]. The neonate's morbidity and mortality are thus mostly determined by the neonate's level of maturity. Infants that are born too soon are more likely than term neonates to suffer from neurological impairment, learning impairments, organ damage, mortality, a chronic illness, and a lifetime handicap. Since there is no accurate way to evaluate maturity directly, gestational age, which is determined during pregnancy, is used as a substitute [3-5].

The primary reason for significant long-term loss of human potential among survivors globally is preterm delivery. Prematurity complications are the only major direct source of neonatal adverse outcomes [6]. The leading cause of death in children under the age of five is pneumonia, with prematurity coming in second. A baby's risk of dying from other causes, primarily neonatal sepsis, increases if they are born too soon [7]. At least half of all neonatal deaths include prematurity as a risk factor, according to research. The metabolic effects of preterm birth are what underlie these variations in growth. Preterm people typically have reduced insulin sensitivity and greater blood pressure, even into their 20s, when compared to those born at term. There have also been connections shown between preterm birth and later diabetes and cardiovascular disease [8]. These results appeared to be related to catch-up growth, suggesting that slow growth correction may not be without drawbacks. The most startling illustration of the risk of all the health outcomes impacted by preterm birth comes from a new study on the long-term mortality risk for these infants. The scientists followed a cohort of births that took place in Sweden between 1973 and 1979 and discovered that patients who were born preterm were not only more likely to die in infancy (age 1 to 5 years), but that this risk was also higher [9]. Early adult deaths were most frequently caused by cardiovascular, endocrine, and respiratory diseases. With an adjusted hazard ratio of 0.96 for each additional week of gestation, this was irrespective of fetal growth and maternal risk factors. Even late preterm babies were at danger; when compared to term babies, those born between 34 and 36 weeks GA had a hazard ratio of 1.31. The potential significance of any extension of GA at birth that can be attained through prophylactic efforts is indicated by this [10-14].

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The following generation may be affected by these health problems. Preterm babies are more likely to be born preterm, which increases the risk of infant mortality. People who are born preterm are less likely to reproduce, and those who do are more likely to do so with preterm babies [15, 16]. When you take into account the current racial gaps in birth outcomes, this data is very sobering. Minority populations in the US experience a significantly higher preterm birth rate. PTB rates for newborns of color in 2007 were 18.3, 12.3, and 11.5 respectively. Preterm infant mortality is higher among minority populations as a result of this.

Materials and Methods

Case control study was conducted at Department of Obstetrics and Gynecology, Kakatiya Medical College, Warangal, Telangana, India, between May 2021 to April 2022 period. Based on a case-control research on the relationship between genitourinary infection and premature labor from May 2021 to April 2022, the sample size was calculated.

Methodology

This case-control study was conducted in the Department of Obstetrics and Gynecology, Kakatiya Medical College, Warangal, Telangana, India after receiving approval from the hospital ethics committee. Women's written informed permission was gained once it was explained to them in the language they understood it best. The minimum sample size for women with a genito urinary infection prevalence of 7% among prenatal cases not having preterm labor and a prevalence of 30% among antenatal cases having preterm labor was calculated to be 25 in each group using the SPS statistical software program (version 17).

Inclusion criteria

- In this study, only singleton pregnant women were included.
- Pregnant patients who were admitted to the labor ward with threatened preterm labor and preterm labor with or without rupture of membranes between 28 and 37 full weeks of gestation were included in case group I.
- The case group was matched in terms of age (teenage pregnancy, pregnancy between the ages of 20 and 30, and pregnancy after the age of 30), parity, and gestational age (completed or more than 37 weeks of gestation with or without history of preterm labor).
- The control group II was made up of antenatal women visiting the hospital's antenatal Outpatient department for routine antenatal check-ups.

Exclusion criteria

- The study excluded women with twin pregnancies, higher-order pregnancies, and antepartum hemorrhages.
- According to ACOG guidelines, preterm labor was defined as four uterine contractions in 20 minutes or eight in 60 minutes plus progressive change in the cervix, cervical dilatation larger than 1 cm, and cervical effacement of 80% or more at 37 full weeks of gestation.
- Four uterine contractions in 20 minutes or eight in 60 minutes along with cervical dilatation less than 1 cm and cervical effacement less than 80% were considered to be signs of threatened preterm labor.
- Per speculum examination was used to identify and confirm leaking, or membrane rupture (change of colour from red to blue).

The health of each woman was evaluated after a careful examination of her medical history, with special focus placed on her history of urogenital infections, poor obstetric history, and premature labor in the past. The gestational age was calculated from the last menstrual cycle date using the Naegeles method or a first ultrasound during the first trimester of pregnancy. Systemic, obstetrical, and general physical examinations were given to all women. Using two sterilized swabs, a Cusco/Sims speculum, and direct eyesight, samples from the posterior fornix of the vagina were taken prior to the initial vaginal examination. The samples were then analyzed for gram stain features and culture-sensitivity using conventional methods. Urine from midstream was sent for cytology and culture-sensitivity testing. A sample for testing the sensitivity of an aerobic culture was sent right away to the hospital's microbiology department, where it was inoculated using a semi-quantitative approach on blood agar and MacConkey's agar. The incubation period for the culture plates ranged from 24 to 48 hours at 37 degrees Celsius. Standard techniques were used to identify isolates.

When necessary, tocolytics or steroids were administered to premature labor patients who had been admitted, and women who had experienced membrane rupture were given antibiotics (cephalosporins). Records of the high vaginal swab cultures and urine reports were gathered. The sensitivity data were used to determine whether to begin or modify antibiotic therapy. The information gathered was tallied and examined.

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Data Analysis

Descriptive statistics were applied to all data, which were reported as mean values and percentages. A variety of statistical comparison tests were carried out. To assess continuous variables, the unpaired t test was utilized. Categorical variables were analyzed using the Fisher Exact Test and the Chi-Square Test. The threshold for statistical significance was set at P 0.05. The data was analyzed using Microsoft Excel 2007 and SPSS version 16.

Results

Table 1: Age at Gestation

Gestational Age	Cases	Controls	Cases %	Control %
≤ 28 weeks	1	0	4.00	0.00
29 to 32 weeks	7	0	26.00	0.00
33 to 36 weeks	17	0	70.00	0.00
37 to 40 weeks	0	20	0.00	100.00
Total	25	25	100	100

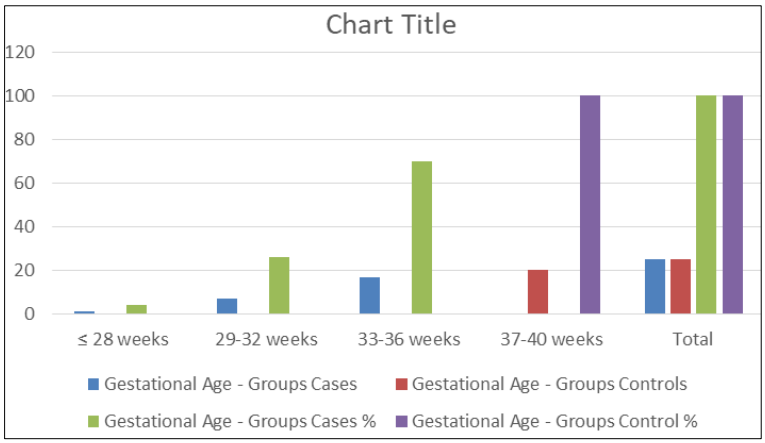

Fig 1: Gestational Age

Table 2: Socioeconomic Situation

Socioeconomic Status	Cases	Controls	Cases %	Control %
Low.	3	3	12.00	12.00
Upp. Lower	5	6	24.00	24.00
Low. Middle	8	6	24.00	38.00
Upp. Middle	9	10	40.00	26.00
Total	25	25	100	100
P value			0.515	

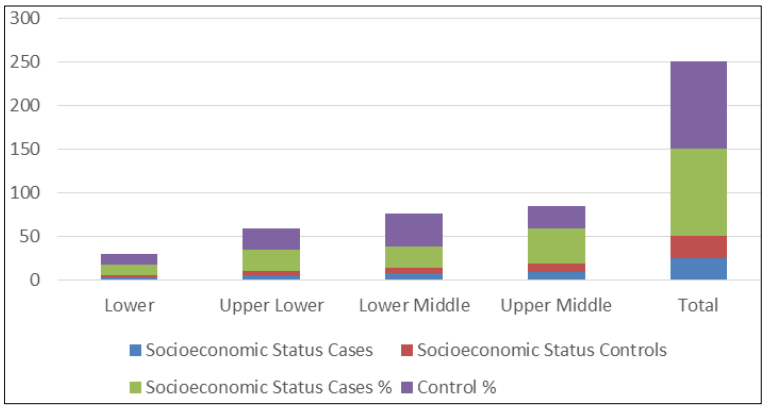

Fig 2: Socioeconomic Status

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Table 3: Body mass index

Preg. BMI	Cases	Controls	Cases %	Control %
Under-weight	4	4	16.00	16.00
Normal	15	20	60.00	80.00
Over-weight	5	1	20.00	4.00
Obese	0	0	0.00	0.00
Total	25	25	100	100
P value			0.641	

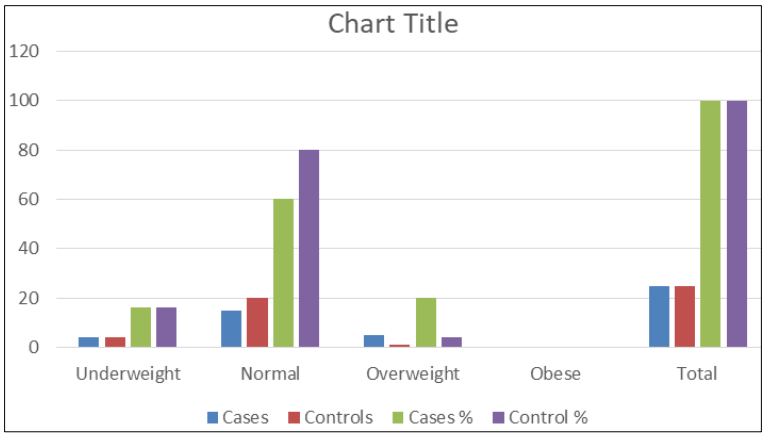

Fig 3: BMI

Table 4: Parity

Parity	Cases	Controls	Cases %	Control %
Primi	4	4	16.00	16.00
G2P1L1	5	1	20.00	4.00
G2A1	15	20	60.00	80.00
G3P2L2	0	0	0.00	0.00
Total	25	25	100	100
P value			0.7234	

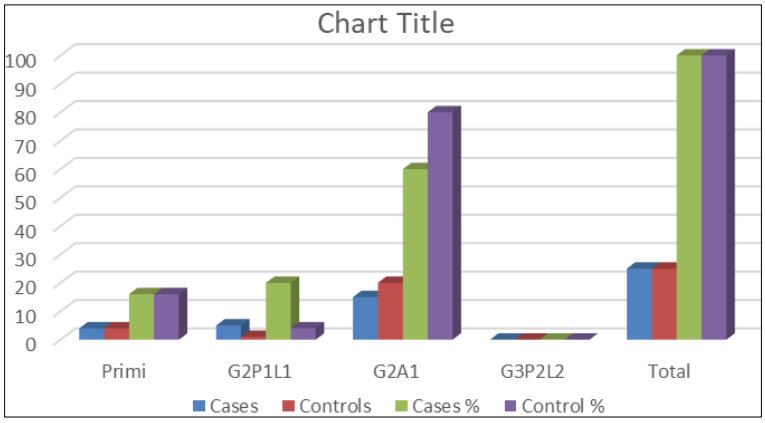

Fig 4: Parity

Table 5: Employment Situation

Employment	Cases	Controls	Cases %	Control %
Employed	10	15	40.00	60.00
Un-employed	15	10	60.00	40.00
Total	25	25	100	100
P value			0.4014	

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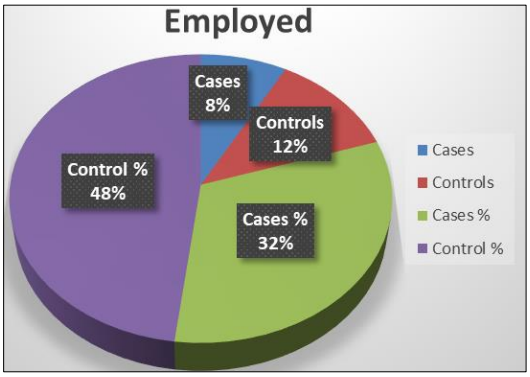

Fig 5: Employment

Table 6: Previous Preterm Delivery History

Previous History	Cases	Controls	Cases %	Control %
Yes	10	10	40.00	40.00
No	15	15	60.00	60.00
Total	25	25	100	100
P value			05124	

Table 7: Culture of Urine

Culture	Cases	Controls	Cases %	Control %
+ve	13	12	52.00	48.00
-ve	12	13	48.00	52.00
Total	25	25	100	100
P value			0.0648	

Table 8: Urine-Isolated Organism

Organism Isolated from urine sample	Cases	Controls	Cases %	Control %	P value
E. coli	4	4	16.00	16.00	4
Enteroccocus	5	1	20.00	4.00	5
Sta. aureus	15	20	60.00	80.00	15
other	1	0	4.00	0.00	0
Total	25	25	100	100	

Table 9: Vaginal Swab

Vaginal Swab	Cases	Controls	Cases %	Control %
+ve	10	15	40.00	60.00
-ve	15	10	60.00	40.00
Total	25	25	100	100
P value			0.0147	

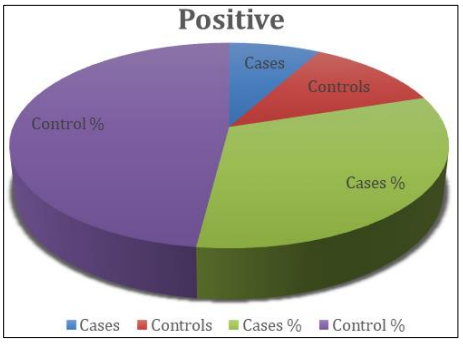

Fig 6: Vaginal Swab

Table 10: Isolated Organism in HVS

Isolated in Organism HVS	Cases	Controls	Cases %	Control %	P value Fishers Exact Test
E. coli	4	4	16.00	16.00	4
Enterococcus	15	20	60.00	80.00	15
Stapy. aureus	5	1	20.00	4.00	5

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Other	0	0	0.00	0.00	0
Total	25	25	100	100	25

Table 11: Urogenital Infection

Urogenital Infection	Cases	Controls	Cases %	Control %
Urine +ve / HVS -ve	15	20	60.00	80.00
Urine -ve / HVS +ve	5	1	20.00	4.00
Both +ve	4	4	16.00	16.00
Both -ve	0	0	0.00	0.00
Total	25	25	100	100
P value			0.0246	

Discussion

In my study, there were no women under the age of 21 among the case group's 25 women, who ranged in age from 21 to 30. 60% of them were first-time mothers, 36% were multiparous, and 4% of them were aborted women. In the control group of 25 women, 48 were between the ages of 21 and 30 and 2 were under 21. The unpaired t test revealed no statistically significant difference in the age distribution between the cases group and control group with a p value of 0.05. The control group was made up of 54% prime gravida, 38% multigravida, and 8% with a prior abortion. Additionally, there was no statistically significant difference in the majority primi (54%) between the cases group and the control group with regard to parity status. In comparison to the control group, the case group included 9 unbooked women, which was statistically insignificant. The socioeconomic standing of the two groups did not statistically differ. 33 women in the case group and 32 in the control group were from the upper middle and lower middle classes, respectively, on the socioeconomic scale. In my study, 7 women belonged to a lower socioeconomic class. Age, parity, booking status, and job status did not have any statistically significant effects on my study [17-19].

In terms of pregnant BMI status, there is a statistically significant difference between the case groups. As a result, we reject the null hypothesis that there is no difference in the research groups' pre-pregnancy BMI status [20].

In the cases group compared to the control group, the prevalence of the overweight and obese BMI category was considerably greater by a difference in percentage of 20.00 percentage points (83% higher). According to Fisher's exact test, this difference is significant with a p-value of 0.0297. My findings concur with those of Cnattinqius *et al* . 20.1% of multigravida in the Case group had had preterm labor or had an abortion in a prior pregnancy, compared to 6.22% in the Control group, indicating a significant correlation between these two past medical events and preterm labor in the current pregnancy (p = 0.0411). Additionally, Pandey *et al* . discovered that a significant contributing factor was a history of premature births [21-25].

In a research by Chhabra and Patil, 28% of the women with PTL showed cervical colonization, while 14% of the women with PTL had urine infection. In my preterm group, 16% of the women had urinary tract infections, 28% had genital tract infections, and 4 of the women had both cultures come back positive, which is consistent with Chhabra and Patil's findings. E coli was the most frequent bacteria found in urine cultures, while Enterococcus faecalis was found in high vaginal swabs. In the control group, 4% of the women had a UTI, 10% had a positive high vaginal swab culture, and 2.1% had both [26-28].

Overall urinary tract infections were found in 16.38% of the case group, which is 3.3 times higher than in the control group. This demonstrates that 3.3 times as many preterm laboring mothers experienced urinary tract infections as term pregnant women. My findings concur with those of Pandey *et al* . who found that urinary tract infections affected 20.34 percent of preterm laboring women and with those of McPheeters *et al* . who found that urinary tract infections affected 17.1 percent of preterm laboring women and 10.9 percent of women who were not in preterm labor. In my study, 10.38% of the Control Group and 28.00% of the Case Group had positive high vaginal swab cultures. Similar to this study, Lajos *et al* . found that 14.20% of preterm labor cases or premature membrane ruptures had endocervical colonization [29-31].

Conclusion

I draw the conclusion from my study that patients with high vaginal swab positivity are linked to a markedly higher incidence of premature labor. In other words, compared to the control group, preterm laboring women had 2.80 times the amount of vaginal infection. Additionally, urinary infection is 4 times more common in preterm laboring women than in the control group, indicating a clear link between urogenital infections and premature labor. Urogenital infections are an important factor in the causes of premature labor that can be avoided. We advise that asymptomatic genitourinary infections be looked at in women having their first antenatal checkup. Preterm labor, preterm birth, and associated neonatal and maternal morbidities can all be reduced to a significant extent by early detection of urogenital infections

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and proper treatment with antibiotics.

Conflict of Interest: None

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