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Original Research Article

Asymptomatic bacteriuria in pregnancy and feto-meternal outcome

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ABSTRACT

Background: Asymptomatic bacteriuria (ASB) is common in pregnancy; its prevalence varies between communities and different ethnicities and countries and has been implicated in adverse pregnancy outcomes. Thus, the present study determined the prevalence of ASB in pregnant women; to study the commonest causative pathogenic and antimicrobial susceptibility pattern, to assess the affliction of bacteriuria with age, parity, and socioeconomic status; and the effect of screening and treatment of ASB on maternal and fetal outcome.
Methods: This was a prospective case-control study involving pregnant women attending the department of obstetrics and gynecology, Jawaharlal Nehru hospital and research Center, Bhilai (C. G.) over a period of 18 months (June 2022 to December 2023). A total of 140 pregnant women were divided into two groups: cases (n=70 patients with ASB) and controls (n=70 patients without ASB). Cases received 7 days course of antimicrobial drugs. Repeat cultures were obtained at 2 weeks and 4 weeks interval to detect any relapses till delivery. At similar intervals, women without bacteriuria were followed up and assessed for bacteriuria throughout the pregnancy till delivery.
Results: The prevalence of ASB was 8.28%. On the first urine culture, *E. coli* (68.57%) was the most common organism grown and amikacin (30%) was the most sensitive antibiotic. The cases and controls did not differ significantly in any of the parameters, except significantly greater proportion of cases than controls had premature rupture of membranes (PROM) (p=0.003), underwent emergency lower segment caesarean section (LSCS) (p=0.049), a NICU stay of 6-10 days (p=0.001), and longer mean NICU stay (p<0.0001), while significantly greater proportion of controls than cases underwent normal vaginal delivery (p=0.007) and a NICU stay of 1-5 days (p=0.010).
Conclusions: The overall prevalence of ASB was 8.28%. Even with treatment, the patients with ASB had a significantly higher risk of PROM, underwent emergency LSCS, and longer NICU stay.

Keywords: Asymptomatic bacteriuria, Fetal outcome, Maternal outcome, Urine culture and sensitivity

INTRODUCTION

Urinary tract infection (UTI) is highly prevalant among females with a higher incidence in pregnant females, due to decreased immunity and other physiological effects of increased progesterone levels.[1] During pregnancy, UTIs are classified as either asymptomatic or symptomatic bacteriuria.[2] ASB is the presence of bacteria more than 10^5(CFU)/ml in the urine of an individual without any symptoms of UTI.[3] Globally, the incidence for ASB among pregnant women ranges from 2.5% to 10% and it ranges from 2% to 15% in developing countries, while a lower prevalence of 2% to 7% is seen in developed countries.[4] However, some studies in India have shown a higher prevalence rate of 17% and 25.3%.[1] Acute cystitis occurs in around 1% to 2% of pregnant women, while the incidence of acute pyelonephritis ranges from 0.5% to 2%.[5]

Bacteriuria often develops in the first trimester pregnancy and is frequently associated with a reduction in concentrating ability.[6] Moreover, the effects of increased levels of progesterone lead to the relaxation of ureteric smooth muscles causing dilatation of ureters, aggravated due to pressure from the expanding uterus causing urinary stasis, renal glycosuria, decreased immunity.[7] The smooth muscle relaxation and subsequent ureteral dilatation in pregnancy are thought to facilitate the growth and ascent of bacteria from the bladder to the kidney. As a result, bacteriuria during pregnancy has a greater risk to progress to pyelonephritis (up to 40%) than in nonpregnant women.[6]

Other factors for ASB in pregnant females such as low socioeconomic status, multiparity, personal hygiene, increasing maternal age, high parity, reduced immune function, poor perineal hygiene, a history of recurrent UTI, gestational diabetes mellitus, neurogenic urinary retention, anatomic or functional urinary tract abnormalities, and increased frequency of sexual activity.[8,9] Physiological proteinuria and glycosuria also promote microorganism growth in the urine of pregnant women.[5]

The causative organisms arise from the normal vaginal, perineal, and fecal flora.[9] The most common microorganism causing ASB is *E. coli* (80%-85%). Other microorganisms include *Klebsiella*, *Proteus*, *Staphylococcus aureus*, Coagulase-negative *Staphylococcus* (CoNS), and *Pseudomonas* spp.[1]

METHODS

Study design

This is a prospective case-control study, performed over a period of 18 months i.e., from 04/06/2022 to 03/12/2023 in the department of obstetrics and gynecology, Jawaharlal Nehru hospital and research center, Bhilai, Chhattisgarh.

Study groups

These definitions delineate two distinct study groups for research on ASB in ANC patients. Study group I (cases) comprises 70 pregnant women identified with ASB. This identification is based on a clean-catch midstream urine culture revealing a single uropathogen with a colony count of 10^5 colony-forming units/ml or more. Conversely, study group II (controls) also includes 70 pregnant women, but these individuals are without ASB. Their classification is determined by a clean-catch midstream urine culture showing either no bacterial growth or a colony count of less than 10^5 colony-forming units/ml. In essence, group I represents the patients exhibiting the condition under study, while group II serves as the comparative group lacking the condition.

Sample size calculation

The sample size calculation presented, aiming for 80% power, begins with the given proportions of PROM in the case group (P1=0.21) and the control group (P2=0.05). Using a standard formula for comparing two proportions, with $Z\alpha/2$ at 1.96 (for a 5% error rate) and $Z\beta$ at 0.84 (for 20% error, or 80% power), the calculation proceeds. While an intermediate step in the provided text incorrectly states $(Z\alpha/2+Z\beta)2$ as 10.36 (it should be 2.802=7.84), the subsequent steps, when correctly executed, lead to a minimum required sample size of approximately 65.385 per group. Rounding this up, a minimum of 66 participants are needed in each group to achieve the desired statistical power. Therefore, the decision to enrol a sample size of 70 participants in each group for the study is appropriate, as it not only meets but slightly exceeds the calculated minimum, providing a small buffer.

Statistical analysis

Data was collected and graphics were designed by Microsoft office excel 2019. The data was analysed with SPSS (IBM, Armonk, NY, USA) version 23.0 for Windows.

Ethics

The study protocol was approved by the institutional ethics committee (IEC) and written informed consent was obtained from the patients prior to study initiation.

Procedure

This study outlines a clear procedure for urine sample collection and processing, alongside strict patient eligibility criteria. Participants are instructed to perform periurethral cleaning before collecting a 30 ml mid-stream urine specimen in a sterile bottle. Samples are immediately sent for laboratory processing within one hour or refrigerated at 4 degrees Celsius if delayed. In the lab, samples are centrifuged at 3000 rpm for 10-15 minutes, the supernatant discarded, and the deposit microscopically examined for pus cells, RBCs, epithelial cells, casts, crystals, and yeast-like cells. For inclusion, participants must be asymptomatic pregnant women attending their first antenatal visit before 28 weeks, who have also consented to urine culture and sensitivity testing. Exclusion criteria are comprehensive, designed to avoid confounding factors, and include patients with symptoms of UTI, known diagnoses of diabetes, hypertension, cardiac, or renal diseases, a history of preterm delivery or urolithiasis, recent antibiotic therapy (within 7 days), multiple pregnancies or fetal anomalies, or those unwilling to participate.

RESULTS

Distribution of patients according to ASB

During the study period, a total of 845 pregnant women were examined. Out of 70 were found to have ASB. Thus, the prevalence of ASB was 8.28%.

Comparison of age groups of cases and controls

In cases (58.57%) and controls (50%), most common age groups were 26-30 years. Both the groups were comparable in terms of age groups and mean age (all p>0.05).

Distribution of cases according to organisms grown

Table 1 depicts the distribution of cases according to organisms grown. On first urine culture, the most common organisms grown were *E. coli* (68.57%), followed by *P. aeruginosa* (14.29%), *K. pneumoniae* (11.43%), and proteus (4.29%). While, *E. faecalis* (1.43%) was the least common organisms grown. All controls n=70 urine culture was sterile.

Table 1: Distribution of cases according to organisms grown, (n=70).

Organisms grown	N	Percentages (%)
E. coli	48	68.57
P. aeruginosa	10	14.29
K. pneumonia	8	11.43
Proteus	3	4.29
E. faecalis	1	1.43

Distribution of cases according to drug given as per sensitivity pattern

Table 2 depicts the distribution of cases according to drug given as per sensitivity pattern. On first urine culture, amikacin (30%), followed by cefotaxime (28.57%), cefuroxime (15.71%), ciprofloxacin (12.86%), and Ceftazidime (7.14%) were the most common sensitive antibiotics. While, cotrimoxazole, nitrofurantoin, piperacillin, and amoxicillin + clavulanic acid (each 1.43%) were the least sensitive antibiotics.

Although NFT is very safe most patients had developed resistance to it. Only 1.43%.

Table 2: Distribution of cases according to drug given as per sensitivity pattern, (n=70).

Sensitivity pattern	N	Percentages (%)
Amikacin	21	30
Cefotaxime	20	28.57
Cefuroxime	11	15.71
Ciprofloxacin	9	12.86
Ceftazidime	5	7.14
Cotrimoxazole	1	1.43
Nitrofurantoin	1	1.43
Piperacillin	1	1.43
Amoxicillin + clavulanic acid	1	1.43

Distribution of cases according to organisms grown in second culture after 2 weeks

The 59 out of 70 cases tested as sterile after first course of antibiotics i. e., 84.29% were cured and hence remaining 11 patients were tested for the organisms.

Comparison of gestational age at delivery of cases and controls

Table 3 depicts the comparison of gestational age at delivery of cases and controls. In cases (78.57%) and controls (90%), most of the patients had gestational age of 37-40 weeks at delivery. Both the groups were comparable in terms of ranges of gestational age at delivery and mean gestational age at delivery (all p>0.05).

Table 3: Comparison of gestational age at delivery of cases and controls.

Gestational age (weeks)	Cases, (n=70) (%)	Controls, (n=70) (%)	P value
30-34	5 (7.14)	3 (4.29)	0.466
34+1-36+6	9 (12.86)	3 (4.29)	0.136
37-40	55 (78.57)	63 (90)	0.083
>40	1 (1.43)	1 (1.43)	1.000
Mean±SD	38.23±1.82	38.71±1.76	0.115

Comparison of PROM and PPROM in cases and controls

Table 4 depicts the comparison of PROM and PPROM in cases and controls, in which 21 out of 70 cases had PROM i. e., 30% whereas only 7 out of 70 controls i. e., 10% had PROM (p=0.003) which is highly significant. Significantly greater proportion of cases than controls had PROM (30% vs 10%, p=0.003), while case and controls did not differ in the terms PPROM (20% vs 8.57%, p=0.053).

Table 4: Comparison of PROM and PPROM in cases and controls.

PROM and PPROM	Cases, (n=70) (%)	Controls, (n=70) (%)	P value
PROM	21 (30)	7 (10)	0.003
PPROM	14 (20)	6 (8.57)	0.053

Comparison of birth weight among cases and controls

Table 5 depict the comparison of birth weight among cases and controls. In 5 out of 70 cases (75.71%) and 51 out of 70 controls (72.86%), most of the patients had ≥2500 gm. Both the groups were comparable in terms of birth weight ranges and mean birth weight (all p>0.05).

Table 5: Comparison of birth weight among cases and controls.

Birth weight (gm)	Cases, (n=70) (%)	Controls, (n=70) (%)	P value
1000-1499	1 (1.43)	1 (1.43)	1.000
1500-2499	16 (22.86)	18 (25.71)	0.693
≥ 2500	53 (75.71)	51 (72.86)	0.699
Mean±SD	2752.21±471.95	2676.86±392.89	0.306

Comparison of APGAR score among cases and controls

Table 6 depicts the comparison of APGAR score among cases and controls. At 1 minute, majority of the cases (89.86%) and controls (94.29%) had an APGAR score at 7-9. At 5 minutes, all the cases (100%) and controls (100%) had an APGAR score at 7-10. Both the groups were comparable in terms of APGAR score at 1 and 5 minutes (both p>0.05).

Table 6: Comparison of APGAR score among cases and controls.

APGAR score (min)		Cases, (n=69) (%)	Controls, (n=70) (%)	P value
1	7-10	62 (89.86)	66 (94.29)	0.333
	4-6	7 (10.14)	4 (5.71)	
5	7-10	69 (100)	70 (100)	1.000

Comparison of NICU stay of cases and controls

Table 7 depict the comparison of NICU stay of cases and controls.

Significantly greater proportion of cases i. e., 13 out of 69 than controls i.e.; 1 out of 70 had an NICU stay of 6-10 days (18.84% vs 1.43%, p=0.001). While significantly greater proportion of controls i.e.; 54 out of 70 than cases i.e.; 39 out of 69 had a NICU stay of 1-5 (77.14% vs 56.52%, p=0.010), The case and controls did not differ in terms of NICU stay of 0 and >10 days (both p>0.05). Moreover, the mean NICU stay was significantly greater among cases than controls (3.30±2.98 days vs 1.74±1.62 days, p<0.0001).

Table 7: Comparison of NICU stay of cases and controls.

NICU stay (days)	Cases, (n=69) (%)	Controls, (n=70) (%)	P value
0	16 (23.19)	15 (21.43)	0.803
1-5	39 (56.52)	54 (77.14)	0.010
6-10	13 (18.84)	1 (1.43)	0.001
>10	1 (1.45)	0 (0)	0.312
Mean±SD	3.30±2.98	1.74±1.62	<0.0001

DISCUSSION

Prevalence of ASB

The present study found the prevalence of ASB to be 8.28%. This aligns with other reports, such as Jayalakshmi and Jayaram's 7.4% and Sujatha and Nawani's 7.3%.[34,40] In contrast, several studies indicated significantly higher prevalences: Agarwal et al reported 17.4%, which is comparable to Jain et al. 16.9% and Prasanna et al 17%.[1,13] Furthermore, Patnaik et al documented a notably higher ASB prevalence of 25.3%.[27] These disparities in prevalence may be attributed to variations in environmental conditions, community social habits, socioeconomic status, and standards of personal hygiene and education.

Table 8: Prevalence of ASB.

Study	Prevalence
Jayalakshmi and Jayaram	7.4%
Sujatha and Nawani	7.3%
Present study	8.28%

Age

Several studies indicate that pregnant women between the ages of 21 and 40 years are at a higher risk for developing UTIs and ASB. For instance, Sujatha and Nawani found that the 21-30 age group had the highest infection prevalence at 72.72%, while Alghalibi et al reported a higher UTI prevalence in women aged 21-25 years.[34,36] Turpin et al specifically noted a higher prevalence of ASB in pregnant women aged 35-39 years, and advanced maternal age (≥35 years) was identified as a risk factor for ASB.[35] Similarly, Imade et al observed that the 26-30 age group had the highest percentage of ASB (53.1%).

However, the present study found no significant difference in age between cases with infection and controls, with both groups largely falling within the 26-30 age range (p=0.309). The mean ages were also comparable (28.74±3.53 years for cases vs 28.40±4.23 years for controls, p=0.603). This finding aligns with Sonkar et al and Kovavisarach et al who also reported no significant association between maternal age and ASB.[38] Therefore, while the 21-40 age range appears to be a general high-risk group, maternal age itself was not consistently identified as a statistically significant factor for the presence of bacteriuria in some studies, including the present one, when comparing infected individuals to controls.

Gestational age at diagnosis of ASB

In the present study, the largest proportion of patients (29 out of 70, 41.43%) had a gestational age of 16-20 weeks, followed by those with a gestational age of 20+1-28 weeks (27 out of 70, 38.57%). The fewest patients (20%) had a gestational age of less than 16 weeks. These findings align with some literature but diverge from others regarding the prevalence of ASB across trimesters. For instance, Sujatha and Nawani demonstrated that culture-positive cases were predominantly observed in the first trimester (45.45%), followed by the second (36.36%) and third (18.18%) trimesters.[33] In contrast, Agarwal et al found a high proportion of ASB in the second trimester (43.7%), followed by the third (29.2%) and first (27.1%) trimesters.[1] Similarly, Byna et al observed that the majority of culture-positive cases were identified in the third trimester (49%), followed by the second (29%) and first (22%) trimesters.[32] Turpin et al however, reported a high percentage of ASB in the first and early second trimesters, attributing this to pregnant women typically attending antenatal clinics for booking during these periods.[35] They further suggested that the higher incidence in the first trimester might be due to hormonal changes occurring before significant anatomical changes.

Organisms grown

The bacteria causing ASB typically originate from the fecal matter and colonize the periurethral area. During pregnancy, maintaining personal hygiene can be challenging, increasing the likelihood of fecal contamination of the urethra. This contamination allows motile bacteria to easily ascend into the urinary tract.

In a recent study involving 70 urine cultures, *E. coli* was the most common organism, identified in 48 cases (68.57%). This was followed by *P. aeruginosa* in 10 cases (14.29%), *K. pneumoniae* in 8 cases (11.43%), and *Proteus* in 3 cases (4.29%). *E. faecalis* was the least common, found in only 1 out of 70 cultures (1.43%).

These findings align with another research. Sujatha and Nawani, for instance, found *E. coli* responsible for 77.27% of ASB cases, with *K. Pneumonia* accounting for 9.09%, and *E. faecalis*, *P. mirabilis*, and *S. aureus* each at 4.54%.[34] Similarly, Sonkar et al reported *E. coli* as the most common isolate (61.1%), while *Enterococcus*, *Proteus*, and *Pseudomonas* were less frequent (each 2.8%).[24] Jayalakshmi and Jayaram also noted *E. coli* as the predominant organism (57.4%). Furthermore, Agarwal et al observed *E. coli* to be most prevalent (39.2%), with other common isolates including *S. aureus* (34.3%), *E. faecalis* (14.7%), and *Klebsiella* Spp. (4.9%).[1]

Collectively, these studies consistently highlight *E. coli* as the primary cause of ASB. This is further supported by fact that uropathogenic *E. coli* possesses virulence factors that enhance its ability to colonize and invade urinary tract.[24]

Table 9: Organisms grown.

Study	Most common organism	Percentages (%)
Sujatha and Nawani	*E. coli*	77.27
Sonkar et al	*E. coli*	61.1
Jayalakshmi and Jayaram	*E. coli*	57.4
Agarwal et al	*E. coli*	39.2
Present study	*E. coli*	68.57

Sensitivity pattern

The antimicrobial sensitivity and resistance pattern vary from community to community and from hospital to hospital. This is because of the emergence of resistant strains, caused by the indiscriminate use of antibiotics.

In the present study, on first urine culture, 21 out of 70 cases (30%) were sensitive to amikacin, followed by cefotaxime (20 out of 70, or 28.57%), cefuroxime (11 out of 70, or 15.71%), ciprofloxacin (9 out of 70, or 12.86%), and ceftazidime (5 out of 70, or 7.14%). Conversely, cotrimoxazole, nitrofurantoin, piperacillin, and amoxicillin + clavulanic acid were the least sensitive antibiotics, each showing 1.43% sensitivity. After two weeks, repeat urine cultures were performed, and drugs were administered according to sensitivity patterns (CLSI guidelines). A third urine culture, conducted after four weeks, showed all samples to be sterile.

In their study, Sujatha and Nawani observed that isolates demonstrated 100% sensitivity to Imipenem and Meropenem. Among aminoglycosides, Amikacin showed 99% sensitivity. Ampicillin and amoxycillin-clavulanic acid displayed 61% and 70% sensitivities, respectively. Cefuroxime exhibited an 86% sensitivity, which was comparable to the sensitivities of ceftriaxone (95%) and cefepime (100%).[34]

In another study, Orji et al reported the highest sensitivity (100%) for amikacin, chloramphenicol, colistin sulphate, ertapenem, imipenem, linezolid, tigecycline, and vancomycin. The least sensitivity was observed with ampicillin/amoxicillin (15.0%) and nalidixic acid (18.9%).[9]

Furthermore, Mwei et al noted 100% sensitivity towards ceftriaxone and gentamycin, and 100% resistance towards ampicillin.[29]

The variation in sensitivity profiles across these studies could be attributed to differences in the underlying organisms and the specific antibiotics tested for sensitivity.

PROM and PPROM

In the present study, PROM was observed in 21 out of 70 cases (30%) compared to only 7 out of 70 controls (10%). This difference was highly significant with a p=0.003, indicating that the occurrence of PROM was three times higher in cases and strongly associated with ASB. Conversely, PPROM did not show a statistically significant difference between cases and controls (20% vs 8.57%, p=0.053), although its occurrence was still more than twice as high in cases. This finding aligns with Byna et al observation that antenatal complications like PROM were more frequent in culture-positive groups (14%) compared to controls (5%, p=0.03).[32] However, other research presents varied results: Sheppard et al found no significant association between PPROM and ASB (p=0.811) and Jain et al reported no significant link with early detected ASB (10.3% vs 4.4%, p=0.059).[40] Interestingly, Jain et al did find a significant association with late-detected ASB (15.9% vs 4.4%, p=0.006).[13] Furthermore, Sheiner et al also demonstrated a significant association between ASB and PROM.

PROM is a recognized complication of ASB, potentially leading to preterm labor, chorioamnionitis, endometritis, and feto-maternal sepsis, ultimately resulting in adverse fetomaternal outcomes.[33] The lack of a significant association between PPROM and ASB in the present study might be due to only a minority of women delivering prematurely. Despite the present study not definitively demonstrating ASB 's effect on PPROM rates, it did reveal a higher PPROM rate in women with ASB (20% vs 8.57%). Although the p value didn't reach statistical significance, the increased occurrence warrants further investigation. It's possible that the fetal proinflammatory cytokine response associated with chronic low-level infection and PPROM could also contribute to the rupture of membranes at term.

Liquor

In the present study, cases 62 out of 70 i.e.; (88.57%) and controls 61 out of 70 i.e.; (87.14%) had clear liquor there was no association between meconium-stained liquor and the occurrence of ASB. Both groups were comparable in terms of liquor appearance (p=0.796). In general, meconium-stained liquor is significantly associated with caesarean section. Moreover, longer exposure to meconium-stained liquor is associated with a lower APGAR score.[33]

Birth weight

In the present study, 75.71% (53 out of 70) of cases and 72.86% (51 out of 70) of controls commonly had a birth weight of ≥2500 gm, with a p=0.699, indicating no significant difference. Both groups were comparable in terms of birth weight ranges and mean birth weight (cases: 2752.21±471.95 grams vs. controls: 2676.86±392.89 grams), with all p values greater than 0.05.

These findings align with Sheppard et al study, which also demonstrated no significant association between birth weight and ASB (3250±232 gm vs. 3275±571 gm, p=0.910).[39]

However, other studies present contrasting results. Byna et al. observed a significantly greater proportion of cases than controls had low birth weight (LBW) (20% vs. 8%, p=0.03).[32] Similarly, Sheiner et al. showed that patients with ASB were more likely to deliver LBW neonates (13.3% vs. 7.9%, p<0.001).[33] Jain et al found that LBW was not significantly associated with early detected ASB (6.9% vs. 8.3%, p=1.000), but it was significantly associated with late detected ASB (20.5% vs. 8.3%, p=0.015).[13]

This significant association with LBW in those studies is likely due to a higher incidence of preterm births within the ASB group. In contrast, the lack of a significant association in the present study could be attributed to the fact that all cases received treatment for ASB, and the majority of both cases and controls delivered at term. This is further supported by evidence that antimicrobial treatment of ASB during pregnancy significantly decreases the risk of subsequent pyelonephritis (from 20-35% to 1-4%) and the risk of having an LBW baby (from 15% to 5%).[27]

APGAR score

In the present study, a large majority of both cases (62 out of 69, or 89.86%) and controls (66 out of 70, or 94.29%) exhibited an APGAR score of 7-10 at 1 minute. By 5 minutes, all cases and controls (100% in both groups) achieved an APGAR score of 7-10. Both groups demonstrated comparability in APGAR scores at both 1 and 5 minutes, with p values greater than 0.05. This finding aligns with Sheppard et al study, which also showed no significant difference between cases and controls regarding APGAR scores less than 4 at 1 minute (0% vs. 3%, p=1.000) or less than 7 at 5 minutes (0% vs. 2.2%, p=1.000).[39] Similarly, Sheiner et al reported comparable 5-minute APGAR scores between cases and controls (0.8% vs. 0.6%; p=0.065). Conversely, vigilant and regular check-ups with a specific treatment in the current study's cases resulted in Apgar scores similar to those of the controls, with a non-significant p value. However, Byna et al observed a significant difference, with a greater proportion of cases than controls having low APGAR scores (19% vs. 6%, p=0.01).[32]

NICU stay

A significantly higher proportion of neonates whose mothers had ASB (cases) experienced a NICU stay of 6-10 days compared to controls (18.84% vs 1.43%, p=0.001). Conversely, a significantly greater proportion of controls had a shorter NICU stay of 1-5 days compared to cases (77.14% vs 56.52%, p=0.010). This indicates a strong association between maternal ASB and neonatal complications requiring prolonged NICU stay. These findings align with Byna et al who observed a greater proportion of NICU admissions in cases (28% vs 12%, p=0.01).[32] The longer NICU stays for neonates born to mothers with ASB could be attributed to increased morbidity linked to the condition. Given that the association between NICU stay and ASB has not been thoroughly evaluated in existing literature, the present study significantly contributes to this field.

Limitations

Research on ASB in pregnancy, aiming to understand its impact on mothers and babies, faces several key limitations.

Firstly, studies often vary in how they define and screen for ASB, leading to inconsistent results. Different treatment protocols and follow-up durations also make comparisons difficult. Secondly, numerous confounding factors like socioeconomic status, pre-existing health conditions, and maternal age can obscure the true link between ASB and pregnancy outcomes. Thirdly, findings from one geographic region or healthcare setting may not apply to others due to differences in populations and bacterial strains.

Fourthly, attributing adverse fetal outcomes solely to ASB is challenging, as many other factors contribute. Long-term effects on the child are also often overlooked.

Finally, the increasing issue of antibiotic resistance complicates treatment effectiveness, and ethical considerations can hinder the conduct of ideal research like placebo-controlled trials. These limitations highlight the need for more standardized and comprehensive future research.

CONCLUSION

The overall prevalence of ASB was 8.28%. Even with treatment, the patients with ASB had a significantly higher risk of PROM, underwent emergency LSCS, and longer NICU stay.

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