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Original Research Article

Prevalence of lower urinary tract symptoms in antenatal women in a tertiary care teaching institute of Uttar Pradesh

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ABSTRACT

Background: Lower urinary tract symptoms (LUTS) are common in pregnancy due to hormonal, anatomical, and physiological changes, posing risks for both maternal and fetal health. Early detection is critical to prevent complications such as pyelonephritis, preterm labor, and low birth weight. Aim was to determine the prevalence of lower urinary tract symptoms among antenatal women.
Methods: This cross-sectional observational study was conducted at MLN Medical College, Prayagraj, from October 2024 to March 2025. One hundred symptomatic antenatal women were assessed through detailed history, examination, and lifestyle evaluation. Women with pre-existing urological conditions, immunocompromise, or recent urinary instrumentation were excluded.
Results: Most participants were aged 25-29 years (42%), multigravida (82%), in the first trimester (67%), from lower middle socioeconomic backgrounds (68%), and urban areas (65%). The predominant symptom was burning sensation/pain during micturition (56%), followed by increased frequency (32%). While 65% consumed ≥2 liters water daily and 80% had >2000 kcal/day intake, LUTS remained prevalent. Lifestyle factors included exercise (49%), tobacco chewing (23%), and caffeine use (13%).
Conclusions: LUTS in pregnancy are prevalent even among women with adequate hydration and nutrition, suggesting multifactorial etiology. Routine screening, lifestyle counselling, and early management- especially in multigravida women in early gestation- are essential to reduce morbidity.

Keywords: Pregnancy, Lower urinary tract symptoms, Urinary tract infection, Antenatal care, Lifestyle factors

INTRODUCTION

Urinary tract infections (UTIs) constitute one of the most prevalent medical complications encountered during pregnancy, with substantial implications for both maternal and fetal health. Globally, UTIs in pregnant women not only contribute to significant morbidity but also represent a preventable cause of adverse obstetric outcomes. The pregnant state is marked by unique and profound anatomical, physiological, and immunological changes that collectively predispose women to the development of UTIs. These adaptations, while essential to support the growth and development of the fetus, inadvertently foster an environment highly conducive to bacterial colonization and infection.[1]

Hormonally mediated changes, particularly the surge in progesterone, induce relaxation of the smooth muscles of the urinary tract, resulting in ureteral dilatation (hydroureter), expansion of the renal pelvis and calyces, and diminished peristaltic activity. The growing uterus, especially in the later trimesters, exerts increasing mechanical pressure on the ureters and bladder. This not only decreases bladder capacity but also hampers complete bladder emptying, leading to increased post-void residual urine and urinary stasis. Such alterations are further

complicated by an increased risk of vesicoureteral reflux, wherein urine flows backward from the bladder towards the kidneys. Together, urinary stasis and reflux establish an ideal environment for the proliferation and ascent of uropathogenic bacteria, most notably *Escherichia coli*, which remains the predominant causative organism in pregnancy associated UTIs.[2]

In addition to these structural and hormonal factors, pregnancy is characterized by significant immunological adaptations, including a physiological reduction in cell-mediated immunity. While this change protects the semi-allogeneic fetus from maternal immune rejection, it also reduces the mother's ability to effectively mount defences against infections. Concurrently, the altered hormonal milieu impacts the vaginal and periurethral flora, favoring colonization by potential pathogens. These factors synergistically increase the susceptibility of pregnant women to both asymptomatic and symptomatic urinary tract infections.[3]

The clinical manifestations of UTI in pregnancy range from asymptomatic bacteriuria- a silent yet significant risk factor- to overt symptomatic infections like acute cystitis, and in severe cases, acute pyelonephritis. The progression from asymptomatic bacteriuria to symptomatic infection is particularly rapid and dangerous in pregnancy, heightening the risk of complications such as maternal sepsis, transient or permanent renal impairment, hypertensive disorders, preterm labor, intrauterine growth restriction, and low birth weight. Such outcomes emphasize the dire consequences of missed or delayed diagnosis, making early detection and intervention a matter of utmost clinical priority.[4]

Accurate diagnosis in pregnant women poses its own set of challenges. The gold standard remains the clean-catch midstream urine sample for both urinalysis and culture. However, contamination due to vaginal secretions or discharge can confound the interpretation of results, leading to both false positives and negatives. Although urine dipstick testing is commonly used in antenatal clinics for rapid screening, its high rate of false positives significantly limits its reliability, necessitating confirmatory urine cultures for definitive diagnosis. Clinical symptoms such as dysuria and hematuria, while highly specific for UTIs, may be absent, especially in cases of asymptomatic bacteriuria, further complicating timely recognition.[5] The epidemiology of UTI in pregnancy reveals that risk emerges as early as the sixth week of gestation and peaks during the second trimester (22nd-24th weeks), coinciding with maximal physiological changes in the urinary tract. In severe or complicated cases- especially when maternal or fetal compromise is suspected- hospitalization, close monitoring of maternal and fetal well-being, and broader microbiological investigations, including cervical and group B *Streptococcus* cultures, are essential. Continuous fetal heart rate and uterine contraction monitoring become particularly important in the context of advanced gestation.[6]

Given the potentially devastating maternal and perinatal consequences, it is universally recommended that all pregnant women undergo routine screening for bacteriuria during antenatal care. Prompt and effective antimicrobial therapy, tailored by urine culture sensitivity patterns, is critical to halting disease progression and preventing complications. The public health burden of UTI in pregnancy is underscored by its preventability- with proper screening, early recognition, and timely management, adverse outcomes can be dramatically reduced. It is against this backdrop of clinical urgency and public health importance that the present study has been undertaken. By assessing the prevalence, clinical features, and outcomes associated with UTIs in pregnant women attending antenatal clinics at a tertiary care rural hospital, this research aims to contribute valuable insights to the body of evidence supporting early detection, targeted intervention, and improved maternal-fetal outcomes. The findings from this study are anticipated to inform local guidelines and enhance clinical practice, ultimately safeguarding the health and wellbeing of both mothers and their newborns.

Aim

To determine the prevalence of lower urinary tract symptoms among antenatal women.

Objectives

To assess the prevalence of lower urinary tract symptoms in antenatal women. To evaluate the impact of lifestyle factors on the occurrence of urinary symptoms in this population.

METHODS

This cross-sectional observational study was undertaken in the department of obstetrics and gynecology at MLN Medical College, Prayagraj, over a six-month period from October 2024 to March 2025. The study population comprised all antenatal women presenting to the outpatient department of SRN Hospital, Prayagraj, with complaints suggestive of lower urinary tract symptoms (LUTS). Upon presentation, each participant underwent a comprehensive evaluation that included a detailed medical history, clinical examination, assessment of personal habits, and documentation of various lifestyle factors potentially influencing urinary health. In addition, all relevant routine laboratory investigations were performed to support clinical findings and rule out confounding pathologies.

Inclusion and exclusion criteria

The inclusion criteria for this study encompassed all pregnant women attending the outpatient services with symptoms indicative of lower urinary tract dysfunction.

The exclusion criteria for this study were defined to ensure the selection of a homogenous population and to minimize

confounding factors that could affect the assessment of lower urinary tract symptoms in pregnancy. Women who were not pregnant were excluded from participation. Additionally, any pregnant woman who declined to provide informed consent for inclusion in the study was not enrolled. Pregnant women with a history of urological surgery, those with urogenital fistula, urolithiasis, or congenital anomalies of the urinary tract were also excluded, as these conditions could independently influence urinary tract symptoms. Furthermore, women who were immunocompromised, including those diagnosed with HIV/AIDS, malignancy, or diabetes mellitus, were omitted from the study due to their increased susceptibility to urinary tract pathology. The exclusion criteria also encompassed pregnant women who had a recent history of urinary tract instrumentation, such as catheterization, as well as those experiencing recurrent urinary tract infections, to avoid confounding by pre-existing or procedural urinary issues. This careful selection process was designed to ensure that the study population accurately reflected the target group for investigating lower urinary tract symptoms in antenatal women.

RESULTS

In this study, antenatal women with lower urinary tract symptoms were predominantly young (mean age 27.8 years), urban residents (65%), and from lower middle socioeconomic backgrounds (68%). Most were in their first trimester (67%) and gravida 2 (65%), with a mean BMI of 23.4 kg/m^2- majority being of normal weight. Burning sensation and pain during micturition was the leading symptom (56%), followed by increased frequency (32%), suprapubic discomfort (10%), and fever with nausea (2%). These results underscore that irritative urinary symptoms are highly prevalent in early pregnancy, especially among young, urban women of modest socioeconomic status.

Table 1: Distribution based on age.

Age in years	Number of patients	Percentage
20-24	28	28
25-29	42	42
30-34	18	18
35-40	12	12

Table 2: Distribution based on socioeconomic status.

Socioeconomic status	Number of patients	Percentage
Upper class	10	10
Upper middle	7	7
Lower middle	68	68
Upper lower	12	12
Lower	3	3

Among antenatal women with lower urinary tract symptoms, the majority reported a daily water intake of 2 liters or more (65%), while 25% consumed 1-2 liters and only 8% drank less than 1 liter per day. Most participants also had a daily caloric intake exceeding 2000 kcal (80%), with smaller groups consuming 1500-2000 kcal (12%) and 1000-1500 kcal (8%). In terms of lifestyle, nearly half engaged in regular exercise (49%), while 23% reported tobacco chewing and 13% consumed caffeine; none of the participants reported smoking or alcohol use, and 15% did not follow any notable lifestyle factor. These results suggest that higher water and calorie intake, along with exercise, are common among this cohort, although a significant subset still engages in potentially adverse lifestyle habits like tobacco use.

Table 3: Distribution based on residential status of study population.

Residential status	Number of patients	Percentage
Rural	35	35
Urban	65	65

Table 4: Distribution based on parity and trimester.

Parity	Number of patients	Percentage
Primigravida	18	18
Gravida 2	65	65
Gravida 3	10	10
Gravida ≥4	7	7
Trimester		
1st trimester	67	67
2nd trimester	22	22
3rd trimester	11	11

Table 5: Distribution based on BMI.

BMI	Number of patients	Percentage
Underweight (<18.5)	8	8
Normal weight (18.5-24.9)	72	72
Overweight (25-29.5)	13	13
Obese (30-34.9)	7	7
Morbidly obese (≥35)	0	0

Table 6: Distribution of study participants according to presenting symptoms.

Symptoms	Number of patients	Percentage
Burning sensation and pain during micturition	56	56
Increased and frequent micturition	32	32
Suprapubic pain and discomfort	10	10
Fever and nausea	2	2

Table 7: Distribution of study participants according to daily water intake.

Vol. of water	Number of patients	Percentage
<1 litre	8	8
1-2 litres	27	25
≥2 litres	65	65

Table 8: Distribution of study participants according to daily calories intake.

Amount of calories	Number of patients	Percentage
1000-1500	8	8
1500-2000	12	12
>2000	80	80

Table 9: Distribution of study participants based on lifestyle factor.

Lifestyle factor	Number of patients	Percentage
Exercise	49	49
Caffeine	13	13
addiction (smoking)	0	0
tobacco chewing	23	23
Alcohol	0	0
None	15	15

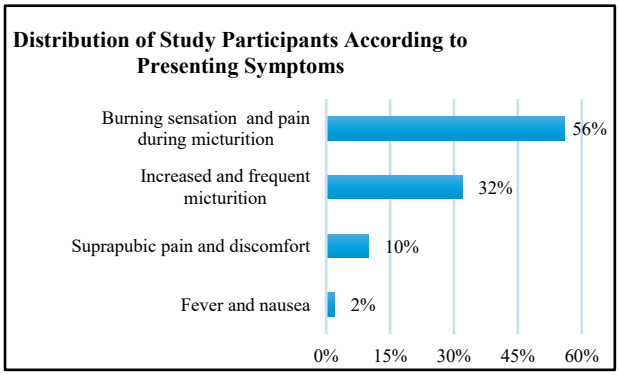

Figure 1: Distribution of study participants according to presenting symptoms.

DISCUSSION

The World Health Organization (WHO) estimates that 10.7% of maternal fatalities globally during pregnancy are caused by a variety of infectious diseases. Recent studies suggest that over 28% of these infections are attributable to the urinary tract. Asymptomatic bacteriuria (ASB) is considered the most significant risk factor for pregnant women who are predisposed to developing pyelonephritis and cystitis.[7] ASB is defined as the presence of more than 100,000 organisms per milliliter in a clean catch urinalysis obtained from an asymptomatic patient. If ASB is left untreated throughout pregnancy, the estimated rate of subsequent urinary tract infection (UTI) is approximately 25%. The prevalence of ASB in non-pregnant women is reported to be 5% to 6%, which is comparable to estimated rates in pregnancy ranging from 2% to 10%. ASB is observed more frequently in women of lower socioeconomic status and in parous women.[8]

Given the high incidence and potential severity of pyelonephritis, the majority of prenatal guidelines recommend that all pregnant women be screened for ASB early in prenatal care, typically during the first or second trimester. The most widely adopted method for screening is a clean catch urine culture. However, more recent research has failed to demonstrate that the treatment of ASB significantly reduces the rates of low birth weight and preterm birth, highlighting the need for further investigation in this area. Cystitis occurs in approximately 1% to 2% of pregnant women, while pyelonephritis also affects 1% to 2%, most commonly during the second trimester.[9]

The risk of developing a UTI begins in the sixth week of gestation and reaches its peak between the 22nd and 24th weeks. In some instances, hospitalization may be required for the management of UTI during pregnancy. Untreated UTI or ASB can have significant consequences for both maternal and fetal health, increasing the risk of pyelonephritis, sepsis, and transient renal failure. In addition, such conditions may contribute to pregnancy-related complications including intrauterine growth restriction, hypertensive disorders of pregnancy, and premature birth. Therefore, it is imperative to screen for UTI, maintain a high index of suspicion, and accurately recognize this condition so that timely and appropriate treatment can be instituted to minimize associated complications. In this context, the present study was conducted in a tertiary care hospital with the aim of determining the prevalence of urinary tract infections among pregnant women attending antenatal clinics (ANC), thereby facilitating early detection and prompt initiation of proper therapy.[10]

In this study, 100 pregnant women with urinary symptoms, irrespective of their gestational age, were assessed. A detailed clinical history was taken for each participant, and urine microscopy was performed to confirm the diagnosis.

In the present study, the majority of antenatal women presenting with lower urinary tract symptoms (LUTS) were within the age group of 25-29 years (42%), followed by those aged 20-24 years (28%). This distribution aligns with existing literature, which consistently identifies women in their reproductive prime as the most affected cohort. For instance, Ezo et al reported that 36.8% of women with LUTS fell within the 25-29 year age range, while Amrutha et al observed a mean participant age of 28.47 years.[11,12] In contrast, Basu et al documented a higher prevalence of asymptomatic urinary tract infections (UTIs) among women aged 20-25 years, with 21.39% of cases being asymptomatic and 8.96% symptomatic.[13] These discrepancies across studies may be attributed to

variations in study methodology, regional demographic profiles, and patterns of healthcare utilization. The predominance of urinary symptoms in younger pregnant women may be explained by the more pronounced physiological and anatomical changes associated with pregnancy- such as ureteral dilation, urinary stasis, and hormonal fluctuations- which are particularly evident in this age group. Furthermore, a significant proportion of the study participants were multigravida, which may increase the risk of LUTS due to the cumulative impact of pelvic floor strain from prior pregnancies.

Notably, women in the 30-34- and 35-40-year age brackets accounted for a smaller share of the study population (18% and 12%, respectively). This may reflect lower conception rates or decreased healthcare-seeking behavior among women in these older age groups. These findings emphasize the need for targeted antenatal screening and counseling initiatives for women aged 20-29 years, who appear to be at the greatest risk for developing lower urinary tract symptoms during pregnancy.

In the present study, the majority of antenatal women presenting with urinary symptoms belonged to the lower middle socioeconomic class, accounting for 68% of the total population. This was followed by the upper lower class (12%), upper class (10%), upper middle class (7%), and lower class (3%). The predominance of participants from the lower middle class may be reflective of the general population structure served by the study institution, as well as the increased vulnerability of this group to health issues due to limited access to healthcare, poor hygiene, and nutritional deficiencies. This trend is clinically relevant, as poor hygiene, limited access to clean water, and overcrowded living conditions are established risk factors for urinary tract infections. Socioeconomic disparities may contribute to delayed health-seeking behavior and inadequate antenatal care, exacerbating the burden of UTI in pregnancy.[14]

With respect to residential distribution, 65% of the participants resided in urban areas, whereas the remaining 35% belonged to rural settings. The urban predominance may be attributed to better healthcare-seeking behavior, improved access to tertiary healthcare facilities, and higher levels of health awareness among urban populations. However, the notable representation from rural areas highlights the importance of outreach and screening programs in peripheral and underserved regions, where delayed diagnosis and limited healthcare resources may contribute to increased morbidity during pregnancy.[15]

With respect to gestational age, the majority of women in the present study reported the onset of urinary symptoms during the first trimester, accounting for 67% of the study population. This finding contrasts with several previous studies, including those conducted by Basu et al, Ezo et al, and Amrutha et al, which documented the highest incidence of urinary tract involvement in the third trimester, with prevalence rates of 47.54%, 56%, and 40.1%, respectively.[11-13] The observed discrepancy may be attributed to differences in study design and inclusion criteria. Notably, our study exclusively enrolled symptomatic women, thereby capturing early clinical presentations. In contrast, the aforementioned studies included both symptomatic and asymptomatic antenatal women, which likely contributed to the higher detection rates in the third trimester, when routine antenatal investigations are commonly performed. These findings suggest that symptomatic urinary tract involvement may manifest earlier in pregnancy, whereas asymptomatic cases often remain undetected until later trimesters. This underlines the importance of early screening and evaluation, particularly in women presenting with urinary complaints during early gestation.

In the current study, a significant majority of the participants were multigravida (82%), a finding that closely parallels those reported by Basu et al (72.31%) and Ezo et al (72.1%). In contrast, Amrutha et al observed an equal distribution of primigravida and multigravida women (50% each), which may be attributable to regional demographic differences, varying reproductive behaviors, or sociocultural factors such as early marriage and preference for larger families.[11-13] The predominance of multigravida women in this cohort suggests a potential link between repeated pregnancies and increased susceptibility to urinary tract infections. This association may be explained by the cumulative physiological and anatomical alterations in the genitourinary tract that occur with successive pregnancies, including pelvic floor weakening, ureteral dilation, and changes in bladder tone, all of which can predispose to urinary stasis and infection.

In the present study, the majority of antenatal women presenting with urinary symptoms had a normal body mass index (BMI) ranging from 18.5 to 24.9, comprising 72% of the study population. This was followed by 13% who were overweight (BMI 25-29.9), 8% who were underweight (BMI<18.5), and 7% who were obese (BMI 30-34.9). Notably, none of the participants fell into the morbidly obese category (BMI≥35).[14]

The predominance of individuals with normal BMI suggests that urinary symptoms during pregnancy are not confined to those with elevated body weight. However, the observed subset of overweight and obese women warrants clinical attention, as existing evidence indicates a clear association between elevated BMI and the risk of urinary incontinence. A randomized clinical trial demonstrated that even a modest weight reduction of approximately 8% in overweight and obese women resulted in a 47% decrease in urinary incontinence episodes, as opposed to a 28% reduction in the control group. These findings underscore the importance of preconceptionally and antenatal counseling regarding healthy weight maintenance as a preventive strategy for urinary morbidity during pregnancy.

Symptomatology analysis in the present study revealed that the most frequently reported clinical complaint among antenatal women was a burning sensation and pain during micturition, observed in 56% of participants. This prevalence is markedly higher than that reported in previous studies, including those by Ezo et al (12.6%) and Amrutha et al (13.9%). The discrepancy can be attributed to the methodological distinction wherein the present study focused exclusively on symptomatic individuals, while the comparator studies included broader antenatal populations encompassing both symptomatic and asymptomatic women. This highlights the clinical relevance of early recognition and evaluation of lower urinary tract symptoms (LUTS) in pregnancy to prevent complications and ensure timely management.[15]

Furthermore, the study explored potential contributory factors related to hydration, nutrition, and lifestyle. Interestingly, a considerable proportion of women presenting with LUTS reported adequate water intake, with 65% consuming ≥2 liters per day. Similarly, 80% of the symptomatic cohort had a daily caloric intake exceeding 2000 kcal. These findings imply that despite meeting recommended hydration and nutritional thresholds, urinary symptoms may still develop, supporting the multifactorial nature of LUTS during pregnancy.

Lifestyle factors were also examined, with 49% of participants engaging in strenuous physical activity, 23% reporting tobacco chewing, and 13% consuming caffeine. Notably, none of the women reported active smoking or alcohol use. Additionally, 15% of the cohort had no identifiable lifestyle-related risk factors. These results suggest that while modifiable behaviors such as excessive exertion or substance use may contribute to symptom development, other physiological or anatomical factors inherent to pregnancy also play a substantial role. This underscores the need for comprehensive antenatal counseling addressing both behavioral and physiological aspects of urinary health.

Bladder function is profoundly influenced by fluid intake. Insufficient hydration can lead to urinary concentration, thereby irritating the bladder mucosa and exacerbating lower urinary tract symptoms (LUTS) as well as predisposing individuals to urinary tract infections (UTIs). Conversely, excessive fluid intake, particularly during late hours, may contribute to nocturnal polyuria and increased urinary frequency. Current recommendations suggest a balanced fluid intake of approximately 25-30 ml/kg/day to help dilute urinary irritants and reduce infection risk.[16] In parallel, obesity is a well-established risk factor for urinary incontinence. A randomized clinical trial demonstrated that an 8% reduction in body weight among overweight and obese women resulted in a 47% reduction in urinary incontinence episodes, compared to only 28% in the control group.[17] Physical activity also plays a vital role in urological health. While moderate and sustained physical activity is associated with a lower incidence of urinary incontinence, sedentary behavior has been shown to increase the risk of LUTS by two to threefold.[18,19] Additionally, pelvic floor muscle training (PFMT), particularly during the antenatal and postnatal periods, has proven effective in both preventing and alleviating urinary symptoms. A systematic review affirmed the efficacy of PFMT in reducing LUTS during late pregnancy and minimizing their persistence postnatally.[20]

These observations collectively highlight the importance of a holistic lifestyle approach- including adequate hydration, proper nutrition, weight management, and regular physical activity- in mitigating LUTS during pregnancy. While increased fluid and caloric intake are generally encouraged during gestation, their impact must be interpreted in light of individual physiology and lifestyle habits, given the complex interplay of hormonal, anatomical, and behavioral factors.

So, the present study delineates important epidemiological and clinical patterns of urinary tract involvement among pregnant women. A notable proportion of symptomatic cases occurred during early pregnancy, predominantly among multigravida women of lower socioeconomic strata. These findings underscore the necessity for targeted antenatal screening, especially in high-risk groups. Variations observed across regional and methodological contexts further emphasize the need for localized epidemiological data to inform and optimize screening protocols and preventive strategies in maternal health care.

This study has several limitations. Being a single-center study with a relatively small sample size, the findings may not be generalizable to broader populations. Its cross-sectional design limits the ability to establish causal relationships. Only symptomatic antenatal women were included, potentially underestimating the true prevalence of urinary tract infections by excluding asymptomatic cases. Data on fluid intake, calorie consumption, and lifestyle habits were self-reported, introducing the possibility of recall or reporting bias. Additionally, microbiological culture and sensitivity profiles were not evaluated, which could have provided more detailed insights into pathogen distribution. The absence of follow-up also restricted assessment of treatment outcomes and pregnancy-related complications.

CONCLUSION

Lower urinary tract symptoms (LUTS) are a common clinical concern in pregnant women, with a multifactorial origin influenced by age, parity, socioeconomic status, gestational age, lifestyle habits, and physiological changes during pregnancy. In our study, the majority of symptomatic women were multigravida, belonged to the 25–29-year age group, and were predominantly from lower middle socioeconomic backgrounds. Most presented with symptoms during the first trimester, with burning sensation and pain during micturition being the most frequent complaint. Notably, a large proportion of women

with LUTS had normal BMI, high daily water intake (≥2 liters), and calorie consumption (>2000 kcal), suggesting that even optimal nutritional and hydration status does not exclude the risk of urinary symptoms. Lifestyle factors such as strenuous exercise, tobacco chewing, and caffeine intake were also associated with these symptoms.

The study emphasizes the need for routine screening for urinary symptoms in antenatal women, especially those in early pregnancy and with identifiable lifestyle risk factors. Counselling regarding balanced fluid intake, pelvic floor exercises, and avoidance of bladder irritants like tobacco and caffeine may help in reducing symptom burden. Further, individualized care and education are essential to prevent complications such as pyelonephritis, urinary incontinence, and adverse pregnancy outcomes.

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