

Influence of regularity of checkups during pregnancy on prevalence of asymptomatic bacteriuria and maternal behaviors regarding urinary infection prevention

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Summary

Purpose of investigation: To investigate how the regularity of checkups in pregnancy influences maternal behavior regarding habits in prevention of urinary tract infection (UTI), the level of information, and finally the prevalence of asymptomatic bacteriuria (AB). **Materials and Methods:** This study included 223 women with regular and 220 women with irregular checkups in pregnancy were given the questionnaire on the following issues: frequency of sexual intercourses during pregnancy, the regularity of bathing and changing of underwear, the direction of washing the genital region after urinating, the regularity of antenatal visits to gynecologist, and the subjective experience concerning the quality of the information received by the healthcare provider. **Results:** AB was present significantly more frequent in group of participants with irregular controls during pregnancy compared to group with regular checkups in pregnancy. The prevalence of AB was higher in those women who had irregular prenatal checkups. Maternal behaviors related with the risk of urinary infections are more frequent among women with irregular prenatal care. **Conclusion:** Results of the present study emphasize the importance of regular prenatal care in AB prevention.

Key words: Asymptomatic bacteriuria; Urinary infection; Checkups; Behavior; Pregnancy.

Introduction

A urinary tract infection (UTI) is an infection that affects any part of the urinary tract. UTI is not only frequent but the range of clinical effect varies from asymptomatic bacteriuria (AB) to acute pyelonephritis. Symptomatic UTI refers to patients whose urine is teeming positive cultures ($\geq 10^5$ CFU/ml) and who have symptoms that can be related to problems in the urinary tract. Asymptomatic bacteriuria (ASB) refers to the presence of two consecutive clear-voided urine specimens both yielding positive cultures ($\geq 10^5$ CFU/ml) of the same uropathogen, in a patient without urinary symptoms [1, 2]. UTI is very common during pregnancy [3]. Pregnant women are more sensitive to UTI when compared to non-pregnant ones due to changes in sex hormone levels, vesicoureteral reflux caused by uterus pressure to adjacent organs, and glycosuria that is very common in pregnancy and suitable for bacterial growth [4]. Asymptomatic bacteriuria and UTIs carry risks of adverse pregnancy outcomes and can have far-reaching consequences for the woman and neonate. Pregnant women with AB are more likely to deliver pre-mature or low-birth-weight infants and to develop pyelonephritis comparing with those without bacteriuria [5]. In addition acute

pyelonephritis has been associated with anaemia, pre-eclampsia, and chronic renal disease (that has been cited as significant adverse obstetric outcome and medical conditions) and with increased neonatal mortality, particularly with Gram negative septicaemia [6-8].

The factors contributing to bacteriuria are age, parity, frequent intercourse during pregnancy, diabetes mellitus, and sickle cell anemia, anomalies of urinary tract, inadequate hygiene of intimate organs, earlier infections, and lower educational and income level [9].

Prenatal care has the potential to address many pregnancy complications, concurrent illnesses, and health problems [10]. An essential aspect of prenatal care models concerns the content of prenatal care, which is characterized by three main components: 1) early and continuing risk assessment, 2) health promotion (and facilitating informed choice), and 3) medical and psychosocial interventions and follow-up [11].

Prenatal care consists of medical checkups and screening tests which are designed to keep mother and baby healthy during pregnancy. It also involves education and counseling about how to handle different aspects of pregnancy. During these visits many issues are discussed, such as healthy

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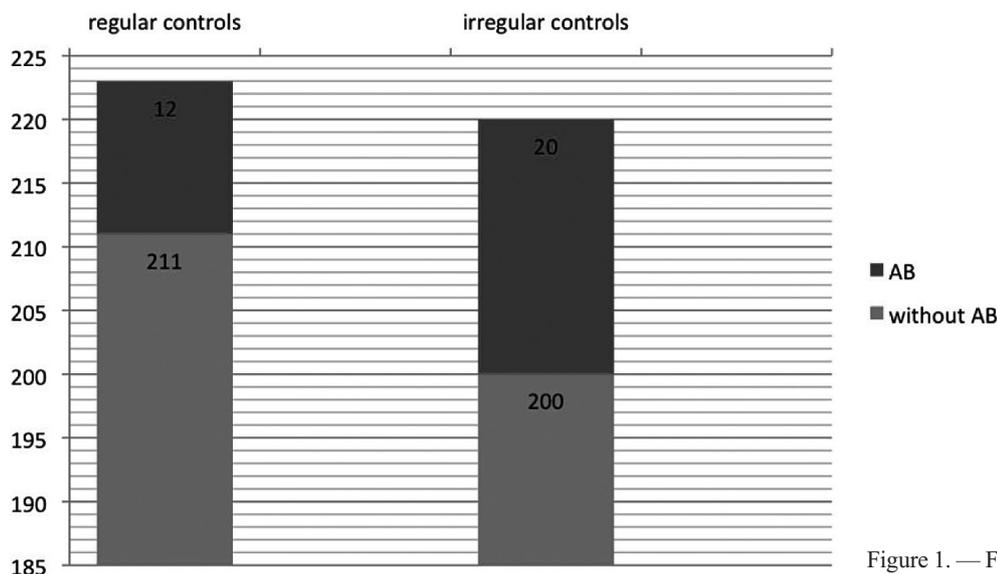


Figure 1. — Frequency of AB in study groups.

and desirable maternal behavior and screening tests. Thus, maternal behavior in prevention of urinary infections is discussed and screening for AB is performed (among other things) during these visits. As long as the pregnancy is straightforward, women should have ten antenatal appointments. The pregnant women are seen once a month during the first and second trimesters. Pregnant women are asked to give a urine sample at antenatal appointments. The urine is checked for several things, including bacteriuria, protein or albumin. If the bacteriuria is found in urine, it may indicate that one has an infection that needs to be treated.

The aim of the study was investigate how the regularity of checkups in pregnancy influences the maternal behavior regarding desired habits in prevention of UI, the level of information regarding these desirable habits obtained during a visit to a doctor, and finally the prevalence of AB.

Materials and Methods

The present prospective cohort study involved pregnant women screened for AB in the Institute of Gynecology and Obstetrics, Clinical Center of Serbia, during the study period of February 1st, 2010 to February 1st, 2013. Eligibility criteria for study participants were: single pregnancy, primiparity, and second trimester of pregnancy, aged between 18 and 38, and no family history of diseases or chronic illnesses. Women with urinary symptoms, frequent urinary infections, renal calculosis, urinary tract anomalies, gynecological diseases, history of surgical procedures, abortions, antibiotic or immunosuppressive therapy in the last six months, and those with conditions related to high risk for AB (such as gestational diabetes and sickle cell anemia) were excluded. Women who require more-frequent checkups in pregnancy, such as those at higher risk of complications (high risk pregnancies, women who had had difficulty conceiving or carrying a baby, had a higher risk of birth defects) were excluded from the study.

After signing informed consent, each participant had an individual conversation with investigator and had to fill the question-

naire. The first part of the survey consisted of questions about age, educational (elementary school, high school, college), and income level (average, below or above the average). In the second part of the questionnaire, participants filled out the survey about following habits: the frequency of sexual intercourses during pregnancy, the regularity of bathing and changing of underwear, and about the direction of washing the genital region (forward to backward or backward to forward) after urinating. The third part comprised the questions related to the regularity of antenatal visits to gynecologist and the subjective experience concerning the quality of the information provided by the healthcare provider related to recommended behavior during pregnancy, particularly associated with the issues addressed in the second part of the questionnaire.

Pregnant patients were divided into two groups: group A involved women who were regularly controlled during pregnancy and group B with irregular checkups in pregnancy. Regular controls were defined according to the standard protocol for pregnancy checkups in Serbia, which imply monthly visits to caregiver during the first and second trimester.

Afterwards, the following tests were done for each participant: urine analysis and urine culture. Morning urine samples were collected from each patient and sent to laboratory for analyses. Samples with over than 100.000 colonies per ml were considered positive.

Statistical analysis

SPSS software package 15.0 was used for statistical data analysis. The authors used descriptive statistical methods and χ square test to compare regularly and irregularly controlled groups. They calculated and estimated the odds ratio (OR) and confidence interval (CI = 95%). Comparison of sexual intercourse frequencies among the subgroups is calculated using the χ square test. Value $p < 0.05$ was considered statistically significant.

Results

During the study period, 443 pregnant women were enrolled to study, 223 in group A and 220 in group B. The main characteristics of study participants are presented in Table 1.

Table 1. — The main characteristics of study participants.

	Group A	Group B	<i>p</i>
Year ¹	26.10±5.36	24.88±4.82	0.0124
High education ²	29	26	0.000000
High school ²	181	196	0.000000
Income ³			
Below average	39	63	0.0203
Average	169	145	
Above average	15	12	
Smokers	79	143	0.000009

¹: Chi-square test; ²: McNemar chi-squared statistics 116.062802;

³: Chi-Square value = 7.79.

Table 2. — The list of other uropathogens discovered in AB participants and their prevalence.

	Group A 12	Group B 20
Escherichia coli	6	11
Klebsiella species	3	2
Pseudomonas species	0	1
Staphylococcus aureus	1	2
Coagulase-negative Staphylococci	2	3
Others	0	1

The prevalence of AB in the present study population was 7.22% and AB was present significantly more frequent ($p = 0.0000001$) in group of participants with irregular controls during pregnancy (20 participants) comparing with group with regular checkups in pregnancy (12 patients) (Figure 1).

Escherichia coli were the primary urinary tract pathogen found in AB. The list of other uropathogens discovered in AB participants and their prevalence are presented in Table 2. The difference in frequency of AB among study group was significant ($p < 0.01$). AB was present in 12 group A participants and in 20 group B participants.

The survey about habits of interest regarding conditions associated with an increased prevalence of asymptomatic bacteriuria in pregnancy, revealed differences among the groups of study participants (Table 3). These differences were significant, with the exception of sexual intercourse frequencies during pregnancy.

Discussion

In the present study population, pregnant women who went to regular controls were significantly different in terms of age, education, income and smoking status compared to those who did not regularly visited the obstetricians. Despite universal healthcare insurance coverage due to constitutional and legislative provisions in Serbia, women with younger age, especially those with lower level of education and lower income level, tended to less of the health services system. Explanation of this phenomenon could be found in the fact

Table 3. — Results of the survey about habits of interest regarding conditions associated with an increased prevalence of asymptomatic bacteriuria in pregnancy.

	regular	irregular	<i>p</i>
<i>Regularity of underwear changing during pregnancy</i>			
Regular ¹	183	185	0.000000
Irregular ¹	40	35	
<i>Regularity of bathing</i>			
Regular ¹	188	176	0.000000
Irregular ¹	35	44	
<i>Frequency of sexual intercourse during pregnancy</i>			
Up to once weekly ²	86	81	0.0781
Two to three times per week ²	108	93	
Four or more times per week ²	29	46	

Direction of washing the genital region after urinating

Forward to backward ¹	171	123	0.000004
Backward to forward ¹	52	96	

¹: McNemar chi-squared statistic; ²: Chi-Square = 5.1.

that Serbia is a non-western developing country, where the poverty and lack of education are the social roots of morbidity [12]. It has been demonstrated that the health cannot be achieved without addressing these social determinants of health, and the answer does not exist only in the health sector [13]. Overcoming barriers to health service access is likely to be more difficult for the poor and other vulnerable groups (for example young people) as lack of information and cultural barriers impede them from benefiting from public healthcare system. Even in most industrialized western countries, studies have shown that non-western women make inadequate use of prenatal care. They are less likely to attend all prenatal care appointments [14].

The prevalence in the entire present study population was in line with literature data [15, 16]. Furthermore, the authors examined the association between the regularity of checkups in pregnancy and AS measured through the prevalence of AB. The prevalence ranged from 5.69% in group A to 10% in group B. The present study showed that women with the irregular checkups in pregnancy were more likely to have AB ($p < 0.001$).

Regarding bacteriologic isolates from pregnant women with AB in the present study, the etiologic agent Escherichia coli was the most frequent, which is in agreement with similar reported studies [16, 17].

The regular bathing and changing of underwear and forward to backward direction of washing the genital region after urinating as desired habits in terms of prevention of urinary infections in pregnancy were more frequent among group A participants. This is in agreement with other authors who have shown that unsatisfying genital hygiene in-

fluences the rate of further infections in pregnancy [16]. From this we might conclude that women with regular examinations during pregnancy have more opportunities to obtain information on proper behavior during pregnancy. This is supported by the fact that the study demonstrated that women who went for regular checkups were significantly more satisfied in relation to the quality and quantity of information provided by gynecologists about the proper actions and habits during pregnancy. A variety of maternal behaviors and practices are linked with adverse health outcomes for both the mother and the infant [18]. Information regarding maternal manners and experiences is required to observe trends, to improve the understanding of the relations between behaviors and health outcomes, to plan and evaluate programs, to direct policy decisions, and to monitor progress towards improving health [19]. AB is one of the five areas of antenatal care where studies have shown that screening and appropriate management improves outcomes [20]. Bearing in mind the presented results of this study, we have to underline the importance of regular prenatal care in prevention of AB.

Conclusion

In spite of near universal coverage for antenatal visits in Serbia, younger women, women with lower levels of education and lower income levels, tend to less use of the health services system. The prevalence of AB is higher in those women who had irregular prenatal checkups. Maternal behaviors related with the risk of urinary infections are more frequent among women with irregular prenatal care. Results of the present study emphasize the importance of regular prenatal care in prevention of AB.

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