

The Proportion of Asymptomatic Bacteriuria among Pregnant Women in a Primary Health Centre Medan, Indonesia

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Abstract: Pregnancy is a risk factor for urinary tract infection (UTI). UTI in pregnant women is generally asymptomatic bacteriuria. Although asymptomatic, 40% of asymptomatic bacteriuria can develop into symptomatic UTI if left untreated, this condition can increase lower weight in infants and premature labor. Screening and treatment for asymptomatic bacteriuria reduce the risk of symptomatic UTI and complications. The objective of this study was to determine the proportion of asymptomatic bacteriuria in pregnant women at the Padang Bulan Health Center Medan. This study is a descriptive study with a cross-sectional design involving 50 pregnant women who came to the Padang Bulan Health Center. Data was obtained by taking the central portion of urine and examine them for UTI. The results of the study found significant bacteriuria as many as in 14 pregnant women (28.0%) with *Escherichia coli* (28.6%) as the most common bacteria. The highest proportion was found in women aged 16-25 (57.1%), with income <Rp.1,000,000, had sexual activity in the last 2 weeks (64.3%), nullipara (71.4%), and with gestational age 13-26 weeks (50.0%). Meropenem, ceftazidime, and nitrofurantoin were the antimicrobials still effective against these isolates.

1 INTRODUCTION

Urinary tract infection (UTI) is a significant public health problem worldwide. More than 10 million outpatient visits and nearly 1 million emergency department visits in the United States are related to UTI every year. Women bear the most risk of infections, nearly half of all women will experience at least one episode of UTI during their lifetime. This difference is attributed to factors such as the urethra is shorter in women, and one-third of the lower part of the urethra continues to be contaminated with pathogens of the vagina and rectum, women tend not to empty their bladder completely like a man, and the female urogenital system is exposed to bacteria during sexual intercourse (Pais and reinstalled, 2018).

Pregnancy itself is an independent risk factor for UTI (Pais and reinstalled 2018). UTI in pregnancy generally do not cause symptoms or asymptomatic bacteriuria (Bukitwetan *et al.*, 2004). It is defined as positive bacteriuria if the colony counts yielding bacterial growth of $\geq 10^5$ CFU/ml of

urine midstream taken by the method of clean-catch (Azkia, 2018). Although the incidence of bacteriuria in pregnant women is similar to that in the nonpregnant, the incidence of pyelonephritis in pregnant women is significantly increased compared with non-pregnant women (Macejko and Schaeffer, 2006). The anatomic and physiologic changes induced by the gravid state significantly alter the natural history of bacteriuria, these changes may cause pregnant women to be more susceptible to pyelonephritis and may require alteration of therapy. About 20% to 40% of pregnant women with untreated bacteriuria will develop pyelonephritis (Schaeffer *et al.*, 2016) and may lead to adverse obstetric outcomes such as prematurity, low birth weight, and higher fetal mortality rate (Turpin *et al.*, 2007). Therefore, the treatment of bacteriuria early in pregnancy has been shown to decrease the incidence of pyelonephritis by 90% (Macejko and Schaeffer, 2006).

Detection asymptomatic bacteriuria in pregnancy is important so asymptomatic UTI could be prevented with treatment. Screening for

asymptomatic bacteriuria became standard obstetric care, and most antenatal guidelines include routine screening for asymptomatic bacteriuria (Schaeffer *et al.*, 2016). USPTF, IDSA, ACOG, American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP) recommend screening pregnant women for asymptomatic bacteriuria. IDSA, AAP, and ACOG recommend screening with urine culture early in pregnancy, whereas USPTF and AAFP recommend screening at 12-16 weeks gestation, or at first prenatal visit (Turpin *et al.*, 2007).

The prevalence of asymptomatic bacteriuria in America ranges from 4% to 7%, but in certain groups can range from about 2% to 11%. In Nigeria, the prevalence of asymptomatic bacteriuria was as high as 86.6%. Prevalence of asymptomatic bacteriuria in pregnancy in Indonesia itself is 7.3%, but research in Tambora Health Center, West Jakarta, showed a higher prevalence at 35.3% (Bukitwetan *et al.*, 2004).

Based on this background, researchers wanted to evaluate the proportion of asymptomatic UTI among pregnant women in the Padang Bulan Clinic, Medan, Indonesia.

2 MATERIALS AND METHODS

2.1 Study Area

This study is a descriptive study with a cross-sectional approach, was carried out in the Padang Bulan Primary health center, Medan.

2.2 Study Population

The population in this study were all pregnant women, while the accessible population of this study was pregnant women attending Padang Bulan Primary Health Center, Medan from September to November 2018. Samples who fulfilled the inclusion criteria selected were asked to participate in the study by signing the consent form. Demographic data were obtained from the questionnaire (Laily, 2017). The sampling technique in this study was non-probability sampling with purposive sampling.

Inclusion criteria included pregnant women attending Pada Bulang Primary Health Centre Medan, and those who agreed to participate. Exclusion criteria included pregnant women with the signs and symptoms of UTI or symptomatic (dysuria, urgency, frequency, suprapubic discomfort,

fever, and low back pain), patients who had difficulty in collecting the urine, and patients who took antibiotics in the previous 2 weeks.

2.3 Specimen Collection and Processing

The proportion of asymptomatic bacteriuria is determined based on the freshly voided midstream urine sample. Subjects were properly educated to collect clean-catch midstream urine with sterile technique into wide-mouthed, sterile capped containers. After urine was collected, urine samples were properly labeled and placed in a cold box. The urine specimen was processed in the Microbiology laboratory at Universitas Sumatera Utara within 2 hours of collection. Samples were cultured on Blood agar and McConkey agar and were incubated at 37°C aerobically for 24 hours. Bacterial isolate growth was monitored on the culture media and was identified using colony characteristics, gram-staining, and series of biochemical test. Antimicrobial susceptibility testing was performed using the disk diffusion method on Mueller-Hinton agar.

The collected data were processed using the computer program. The results of the examination were recorded, compiled, and analyzed by the Chi-Square test.

3 RESULTS

Fourteen of 50 pregnant women (28%) who were analyzed with urine culture and had significant colony counts ($\geq 10^5$ CFU/mL) had asymptomatic bacteriuria (table 1). The most dominant bacteria was *Escherichia coli* (28,6%), followed by *Staphylococcus coagulase negative* (21,4%), *Klebsiella pneumonia* (14,3%), *Pseudomonas aeruginosa* (14,3%), *Staphylococcus aureus* (7,1%), *Klebsiella oxytoca* (7,1%), and *Staphylococcus epidermidis* (7,1%) (table 2).

Table 1: Distribution of frequency of pregnant women based on colony count.

Colony counts	Frequency (n=50)	%
Significant growth ($\geq 100,000$ CFU/ml)	14	28.0
No significant growth ($< 100,000$ CFU/ml)	17	34.0
No growth	19	28.0

Table 2: Bacterial isolates among pregnant women with significant bacteriuria

Bacterial isolate	Frequency (n=14)	%
<i>Escherichia coli</i>	4	28.6
<i>Staphylococcus coagulase negative</i>	3	21.4
<i>Staphylococcus aureus</i>	1	7.1
<i>Staphylococcus epidermidis</i>	1	7.1
<i>Klebsiella pneumonia</i>	2	14.3
<i>Klebsiella oxtica</i>	1	7.1
<i>Pseudomonas aeruginosa</i>	2	14.3

The collected data showed that pregnant women with asymptomatic bacteriuria cases were found mostly in pregnant women with age group 16-25 years old (57,1%), were in high school (42,9%), had monthly income $< 1.000.000$ Rupiah (50,0%), had sexual intercourse in the last 2 weeks (64,3%), nullipara (71,4%), and were in second trimester (50,0%).

Table 3: Distribution of frequency of pregnant women with asymptomatic bacteriuria based on the characteristic.

Characteristics	Total number (n=14)	%
Age group (years)		
16-25	8	57.1
26-35	5	35.7
36-45	1	7.1
Educational status		
Junior high school	3	21.4
High school	6	42.9
Higher education/university	5	35.7
Monthly income		
$< \text{Rp. } 1.000.000$	7	50.0
$\text{Rp. } 1.000.000\text{-Rp. } 3.000.000$	4	28.6
$> \text{Rp. } 3.000.000$	3	21.4
Sexual intercourse in the last 2 weeks		
Yes	9	64.3
No	5	35.7
Parity		
Nullipara	10	71.4
Primipara	2	14.3
Multipara	2	14.3
Trimester		
Trimester 1	2	14.3
Trimester 2	7	40.0
Trimester 3	5	35.7

Based on table 4, gram-negative isolates were found sensitive to meropenem (100%), ceftazidime (88,8%), piperacillin-tazobactam (77,7%), ampicillin-sulbactam, cefotaxime, chloramphenicol, nitrofurantoin (55,5%). And gentamycin (44,4%). On the other hand, all gram-positive isolates were found sensitive nitrofurantoin and meropenem (100%), followed by gentamycin (40%) and chloramphenicol (20%).

Table 4: Antimicrobial susceptibility pattern of bacterial isolates

Gram (-) isolates	Profile	Antimicrobial sensitivity, n (%)							
		SAM	CTX	CAZ	C	CN	MEM	F	TZP
<i>E. coli</i> (4)	S	2 (50)	3 (75)	3 (75)	3 (75)	3 (75)	4 (100)	3 (75)	3 (75)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	2 (50)	1 (25)	1 (25)	1 (25)	1 (25)	0 (0)	1 (25)	1 (25)
<i>Klebsiella pneumoniae</i> (2)	S	1 (50)	1 (50)	2 (100)	1 (50)	1 (50)	2 (100)	1 (50)	2 (100)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	1 (50)	1 (50)	0 (0)	1 (50)	1 (50)	0 (0)	1 (50)	0 (0)

<i>Pseudomonas aeruginosa</i> (2)	S	2 (100)	1 (50)	2 (100)	0 (0)	0 (0)	2 (100)	1 (50)	1 (50)
	I	0 (0)	1 (50)	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)	0 (0)
	R	0 (0)	0 (0)	0 (0)	1 (50)	1 (50)	0 (0)	1 (50)	1 (50)
<i>Klebsiella oxytica</i> (1)	S	0 (0)	0 (0)	1 (100)	1 (100)	0 (0)	1 (100)	0 (0)	1 (100)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	1 (100)	1 (100)	0 (0)	0 (0)	1 (100)	0 (0)	1 (100)	0 (0)
Total (9)		5 (55,5)	5 (55,5)	8 (88,8)	5 (55,5)	4 (44,4)	9 (100)	5 (55,5)	7 (77,7)

Gram (+) isolates	Profile	Antimicrobial sensitivity, n (%)						
		AK	MEM	F	C	E	CN	DA
<i>Staphylococcus coagulase (-)</i> (3)	S	0 (0)	3 (100)	3 (100)	1 (33.3)	0 (0)	2 (66.6)	0 (0)
	I	0 (0)	0 (0)	0 (0)	1 (33.3)	0 (0)	0 (0)	0 (0)
	R	3 (100)	0 (0)	0 (0)	1 (33.3)	3 (100)	1 (33.3)	3 (100)
<i>Staphylococcus aureus</i> (1)	S	0 (0)	1 (100)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	1 (100)	0 (0)	0 (0)	1 (100)	1 (100)	1 (100)	1 (100)
<i>Staphylococcus epidermidis</i> (1)	S	0 (0)	1 (100)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	1 (100)	0 (0)	0 (0)	1 (100)	1 (100)	1 (100)	1 (100)
Total (5)		0 (0)	5 (100)	5 (100)	1 (20)	0 (0)	2 (40)	0 (0)

4 DISCUSSION

This study is a cross-sectional study to see the proportion of asymptomatic bacteriuria among pregnant women in Padang Bulan Primary Health Center, Medan.

The result In this study found the proportion was 28%. This proportion is higher than the study in Sundari Hospital Medan with the proportion of 21.8% (Novita, 2016), but lower than the 30.2% reported in Janti Primary Health Center, Malang (Zahroh, 2014).

The most common bacterial isolated were *E. coli*. This result is consistent with Tosin *et al.* (2014), Enayat *et al.* (2008), and Tadesse *et al.* (2018), that *E. coli* is the dominant organism

causing asymptomatic bacteriuria. *Escherichia coli* is a normal flora in the vaginal and rectal area (Tosin *et al.*, 2014), and because the female urethra is shorter compared to men therefore the chance of bacteria ascends into the bladder is higher and may cause an infection (Curtiss *et al.*, 2017). This bacteria also has a unique structure (pilus adhesions) which help the bacteria for attachment to the uroepithelium lining and prevent them from urinary lavage, which allows them for multiplication and tissue invasion resulting in invasive infections in pregnancy (Tadesse *et al.*, 2018).

In this study, according to age the highest frequency of asymptomatic bacteriuria in pregnant women was in the age group 16-25 years old. This result is in accordance with the research of Tadesse *et al.* (2018) with the most bacteriuria was in the age

group 18-25 years old. This might be due to that early and intensive sexual intercourse which may cause minor urethral trauma and transfer bacteria from the perineum into the bladder. In contrast to findings by Tosin *et al.* (2014) with the highest prevalence of asymptomatic bacteriuria in the age group 25-34 years old.

According to educational status, we found a higher frequency of asymptomatic patients in the high school group. A similar result was reported by Laily in Kenangan Primary Health Center Puskesmas Kenangan, Kabupaten Deli Serdang (Laily, 2017). Most asymptomatic pregnant women also had monthly income <1.000.000 rupiah, as found by Tadesse *et al.* (2018). Reported pregnant women with low family income were found 7 times more likely to be positive for asymptomatic bacteriuria (Tadesse *et al.*, 2018). This could be due to the relation of low socioeconomic status with nutrition and immunity (Emiru *et al.*, 2013).

In this study, we also found that asymptomatic bacteriuria was more common in pregnant women who had sexual intercourse in the last 2 weeks. A similar finding was reported by Zahroh *et al.* where 61.5% of pregnant women with high sexual activity had bacteriuria. Pregnant women who had sexual intercourse >3 per week were more likely have UTI than women who had sexual intercourse <3 per week, with the theory that sexual intercourse can potentially cause skin irritation which increases the occurrence of urethra infection (Zahroh *et al.*, 2014). Another theory that is sexual intercourse can encourage bacterial ascending (Curtiss *et al.*, 2017).

According to parity, the highest frequency of asymptomatic bacteriuria was in pregnant women with nullipara, this finding is in line with studies by Zahroh *et al.* (76,9%) (Zahroh *et al.*, 2014). Different finding reported by Turpin *et al.* with multiparity had the highest percentage of asymptomatic bacteriuria (Turpin *et al.*, 2007).

In this study, pregnant women in the second trimester of pregnancy had the highest percentage of asymptomatic bacteriuria followed by pregnant women in the third trimester of pregnancy, similar finding by Tosin *et al.* was also reported in Lagos, Nigeria (45,3%) (Tosin *et al.*, 2014). Different findings reported by Turpin *et al.* with most of the infected subjects were in their first and early second trimesters. This could be because most pregnant women report at the antenatal clinic for booking during these periods (Turpin *et al.*, 2007) it also indicated that the gold standard for screening asymptomatic bacteriuria is in early pregnancy of 12-16 weeks (Tadesse *et al.*, 2018).

The dominant organism in this study was *E. coli* which was sensitive to meropenem (100%), nitrofurantoin, piperacillin-tazobactam, gentamycin, chloramphenicol, ceftazidime, and cefotaxime (75%). A similar finding was reported by Tosin *et al.* where *E. coli* was observed to be sensitive to nitrofurantoin and gentamycin (Tosin *et al.*, 2014).

5 CONCLUSIONS

The proportion of asymptomatic bacteriuria in pregnant women in Padang Bulan Primary Health Center was 28.0%, and the most frequent isolates were *Escherichia coli* followed by *Staphylococcus coagulase negative*. Most pregnant women with asymptomatic bacteriuria were in the age group of 16-25 years, with educational status in high school, low socioeconomic status, had sexual intercourse in the last 2 weeks, at trimester II, and a nullipara.

The antibiotic sensitivity from this study showed all gram-negative and gram-positive were sensitive to meropenem (100%), and nitrofurantoin was sensitive to gram-negative (100%).

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