The influence of maternal age and gestational age to urinary tract infection in Lempake Primary Health Care, East Kalimantan, Indonesia

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ABSTRACT

Introduction: Urinary tract infection (UTI) is the second-largest of the world's health burden just behind the respiratory tract infection. Pregnant women are at risk of suffering from urinary tract infection due to anatomical and physiological changes along the urinary tract. The study aims to find out the influence of maternal age and gestational age to UTI in Primary Health Care Center Lempake.

Method: The research method was *cross sectional* with *total sampling* and using secondary data from the register book of emergency unit in Primary Health Care Center Lempake including all UTI cases in pregnancy from all pregnant patients undergone urinalysis from January 2017 until October 2018 (48 patients). It was then analyzed using logistic regression with STATA version 14.

Result: Most of subjects distribution were maternal age group 26-35 years old (39.6%), third trimester of pregnancy (66.7%), and negative result of bacteriuria (81.3%). Maternal age group 26-35 years old was the the most one suffering from UTI/positive result of bacteriuria (55.6%) and had tendency 5.4 times to suffer from urinary tract infection (p=0.147; CI=0.56-51.71; OR=5.36) while gestational age in third trimester showed significant influence to urinary tract infection (p=0.05; CI=0.03-1.00; OR=0.18). The prevalence of urinary tract infection in this research was 18.7%.

Conclusion: There were significant influences among maternal age and gestational age to UTI in Primary Health Care Center Lempake.

Lempake Primary Health Care, East Kalimantan, Indonesia

INTRODUCTION

Urinary tract infection (UTI) is the second largest of world's health burden just behind the respiratory tract infection. Urinary tract infection is the infection along the urinary tract, including urethra, urinary bladder, ureter, and kidney. Generally, women are more at risk suffering from UTI than men because of the shorter urethra in women compared to men, anatomically. Pregnant women are at risk of suffering from urinary tract infection due to anatomical and physiological changes along the urinary tract. Approximately 20% of urinary tract infection cases happened in pregnant women.[1-4]

Anatomical and physiological changes, as well as hormonal effect in pregnancy, play significant role in increasing the risk of urinary tract infection. Progesterone effect toward muscle tone and motility as well as mechanical obstruction due to uterine enlargement will dilate the pelvis calyces system and ureter, make the urinary bladder capacity increased, vesicoureteral reflux, rest urine after voiding and increased risk of urinary tract infection at last. Fetal head pressure also prevents blood and lymph drainage from the basis of urinary bladder, so that the affected area will be edematous and

susceptible to trauma. Moreover, shorter urethra in women compared to men, anatomically, will make contamination from germs around the perianal area, vagina, and rectum more easily to invade, and eventually increase the risk of urinary tract infection in pregnant women.[1-5]

Pregnant women are one of the community focus on health service and in which urinary tract infection cases play a significant role in health burden. The signs and symptoms of urinary tract infection are micturition urgency, frequent urination, and/or pain along lower urinary tract. Nevertheless, not all urinary tract infection cases will come into symptoms or signs. The indicator of urinary tract infection in either symptomatic or asymptomatic patients is the finding of bacteria in urine culture for about 100,000 CFU/ml, which is known as bacteriuria. If urinary tract infection cases in pregnant women are left untreated, they will make many complications in pregnancy and maternal health. The complications of urinary tract infection in pregnancy include anaemia, preeclampsia, renal failure, and septicaemia whereas complications in fetal include low birth weight infant, intrauterine growth retardation (IUGR), premature delivery,

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intrauterine fetal death (IUFD). Adequate treatment for UTI in pregnancy will decrease risk of pregnancy complications as high as 77%. Studies of prevalence and risk factor of UTI in pregnancy are important in the making of prevention strategy regarding of the impact on maternal health. Therefore, early recognition of the aetiology, risk factor, and the predictor value of UTI in pregnancy become very important in case of prevention and treatment of UTI.[1-5]

Risk factors of UTI are commonly diabetes mellitus (prevalence for about 8-14%) and faecal incontinence. However, UTI cases in pregnancy are associated with several factors, such as uropathogenic exposure, increasing factor of uropathogenic colonisation, and immune response to uropathogenic colonisation. The gestational age group of 9th until 17th week is more at risk of suffering from bacteriuria. Eighty per cent of pregnant women with gestational age of 12th - until 16th week suffer from asymptomatic bacteriuria.[1,2,4,5]

Several factors which also influence UTI cases in pregnancy include younger maternal age (24 - 34 years old), gestational age (highest incidence at 30th until 32nd week), history of previous UTI, history of urological disorder, lower education status, sexual activity (sexual intercourse a day before or in previous 48 hours will increase risk into 60 times higher), habitual of voiding delay for more than 4 hours, drinking inadequate volume of water, inappropriate habitual of genital wash from rear to front, multiparity, and poor socioeconomic condition.[1,3,4,5] This research selected the maternal age and gestational age as the risk factors and then analysed their influences to UTI cases in pregnancy in Primary Health Care Center Lempake.

This research was conducted in Primary Health Care Center Lempake, in area of Lempake village, subdistrict of North Samarinda, City of Samarinda, Province of East Kalimantan, located in suburban area of Samarinda, relatively accessible to and from downtown and not far away from city center, with relatively heterogeneous community and total population of 16,363 inhabitant with projection number of pregnancy women for about 427 women/year.[6] There was no previous research data about the influence of risk factors to UTI cases in pregnancy in Primary Health Care Center Lempake. Hence, this research was conducted to find out the influence of two risk factors of UTI in pregnancy.

METHOD

The research method was *cross sectional* with *total sampling* and using secondary data from the register book of emergency unit in Primary Health Care Center Lempake including all UTI cases in pregnancy from all pregnant patients undergone urinalysis from January 2017 until October 2018. Diagnosis of UTI must include result of bacteriuria in the urinalysis (positive or negative bacteriuria).

The next step was processing of data using software, STATA version 14, then the processed data was displayed in narrations and tables. This research selected urinary tract infection (UTI) as dependent variable, whereas maternal age and gestational age as independent variable. Subjects distribution would be processed into descriptive univariate analysis and displayed into number of subjects (n) and percentage (%). In order to find out the risk factors (maternal age and gestational age) which influenced UTI cases in pregnancy in Primary Health Care Center Lempake, therefore bivariate analysis would be conducted using cox or logistic regression test. Logistic regression analysis would be used if the smallest percentage of subgroup from dependent variable (in this case was UTI) less than 20% whereas if the percentage more than 20% then the analysis would use Cox regression. Odds Ratio (OR) would be calculated to identify correlation of the independent variables to dependent variable. Independent variables which owned value of $p \leq 0.05$ would be thought to have significant relationship to UTI cases in pregnancy in Primary Health Care Center Lempake.[7,8]

RESULTS

Table 1, showed distribution of subjects according to maternal age, where age group 26-35 years old was the most one with the total of 19 pregnant women (39.6%). Distribution of subjects according to gestational age, where third trimester of pregnancy (26th – 40th week) was the most one with total of 32 pregnant women (66.7%). Distribution of subjects according to UTI cases, where the negative result of bacteriuria was the most one with total of 39 pregnant women (81.3%). Prevalence of UTI (positive bacteriuria) in this research was 18.7%.

Maternal age group 26-35 years old was the the most one suffering from UTI/positive result of bacteriuria (55.6%) and had tendency 5.4 times to suffer from UTI compared to maternal age group 16-25 years old (p=0.147 CI=0.56-51.71; OR=5.36) while gestational age in third trimester showed significant influence to UTI cases in pregnancy in Primary Health Care Center Lempake (p=0.05; CI=0.03-1.00; OR=0.18).

Table 1   Subject characteristics

	Distribution of subjects (n = 48)	
	N	%
Maternal Age		
16 - 25 years old	16	33.3
26 - 35 years old	19	39.6
≥ 36 years old	13	27.1
Gestational Age		
1st Trimester (0 – 12th week)	11	22.9
2nd Trimester (13th – 25th week)	5	10.4
3rd Trimester (26th – 40th week)	32	66.7
UTI		
Positive Bacteriuria	9	18.7
Negative Bacteriuria	39	81.3

Table 2   Distribution of subjects according to maternal age and gestational age compared to UTI

	UTI						
	Bacteriuria (+) (n = 9)		Bacteriuria (-) (n = 39)				
	N	%	N	%	OR	95% CI	p
Maternal age							
16 - 25 years old	1	11.1	15	38.5		Reference	
26 - 35 years old	5	55.6	14	35.9	5.36	0.56 - 51.71	0.147
≥ 36 years old	3	33.3	10	25.6	4.50	0.41 - 49.63	0.219
Gestational Age							
1st Trimester (0 - 12th week)	4	44.5	7	17.9		Reference	
2nd Trimester(13th - 25th week)	2	22.2	3	7.7	1.17	0.13 - 10.22	0.889
3rd Trimester(26th - 40th week)	3	33.3	29	74.4	0.18	0.03 - 1.00	0.050

DISCUSSION

This research had found 9 pregnant women (18.7%) suffering from UTI in pregnancy. This result was higher than a study conducted by Lee et al. which showed that a pregnant woman had a risk of suffering from UTI for about 2 - 10%.[9-11] However, this research result was not far away from study conducted by Fitzgerald et al., i.e. the prevalence of UTI in pregnancy for about 20 %.[1] Several researches in other countries also found almost the same result in Ethiopia about 14 %, in Tanzania about 15.5 %, and in Saudi Arabia about 20%.[10,11] Other studies in different areas in Indonesia even found very high number of UTI prevalence in pregnancy, in Deli Serdang, North Sumatera about 38.9 %, in Jakarta about 35.3 %, in Medan, North Sumatera about 35%, in Malang, East Java about 30.2 %, in Sumedang, West Java about 30.2 %.[12-16] The variation of similar research results might be caused by different research methods and geographic locations.

Maternal age group 26-35 years old was the most one suffering from UTI/positive result of bacteriuria (55.6%) and had tendency 5.4 times to suffer from urinary tract infection. Almost the same thing was also found in research conducted by Laily et al. in Deli Serdang, North Sumatera, which was found about 71.4% of research subjects with significant bacteriuria aged 26-30 years old.[12] Other study which also supported that result, was conducted in Ethiopia suggested that there was significant correlation between maternal age and UTI cases in pregnancy. That study also suggested that age group 25 - 34 years old was at risk 3 times higher to suffer from UTI.[2]

Maternal age group 26 – 35 years old is the productive age group, and in this research was found that the percentage of subjects at that age group was the the most one suffering from UTI/ positive bacteriuria (55.6%). At that age group, subjects are sexually active, so that the possibility of urethra orifice being infected by uropathogenic bacteria at the time of sexual intercourse become higher.[12]

Different results were found from several studies in other areas of Indonesia which suggested that there was no significant correlation between maternal age and UTI cases in pregnancy. This contrary result could be found in research conducted by Andi Alifia Ayu Delima in district of Gowa, province of South Sulawesi which suggested that there was no significant influence from maternal age to UTI cases in pregnancy.[17] Moreover, the studies conducted by Edy Fakhrizal in Riau and Zahroh et al. in Malang, East Java also found that there was no significant correlation between maternal age and UTI cases in pregnancy.[15,18] Studies in other countries also found the contrary result that there was no significant correlation between maternal age and UTI cases in pregnancy.[3,19,20]

In this correlative research which was conducted in Primary Health Care Center Lempake, it was found that gestational age group of third trimester had quite significant influence to UTI cases in pregnancy. This result was also supported by the research conducted by Andi Alifia Ayu Delima in district of Gowa, province of South Sulawesi, which suggested that there was significant influence of gestational age to UTI cases in pregnancy.[17] Furthermore, a study conducted by Laily et al. in

Deli Serdang, North Sumatera also found that there was significant influence of gestational age to increased risk of UTI in pregnancy.[12]

A research conducted by Bukitwetan et al. in Jakarta found that the biggest proportion of UTI cases in pregnancy was at gestational age group >28 week.[13] In the study conducted by Andi Alifia Ayu Delima in district of Gowa, province of South Sulawesi, also found that the largest proportion of UTI cases in pregnancy was at gestational age group 26 – 40 week (third trimester), for about 61.1%.[17] Other study conducted by Emiru et al. in northwest Ethiopia also found similar result that highest incidence of UTI cases in pregnancy was at gestational age group 30 - 32 week.[3] In contrary to these findings, a study conducted by Laily et al. in district of Deli Serdang, province of North Sumatera, found that the biggest proportion of UTI cases in pregnancy was at second trimester (57.1%) and had tendency 4 times higher than first trimester to suffer from UTI.[12]

Frequently, it is found that increased incidence of significant bacteriuria concomitant with the advanced gestational age. At first trimester, significant bacteriuria cases are found in 14.3% and will jump until 57.1% at second trimester. Such things suggest that bacteriuria cases will increase concomitantly with gestational age. Increased prevalence of UTI concomitant with advanced gestational age, is caused by physiological changes in pregnancy. Theoretically, the more advance the gestational age, the more susceptible to UTI the subject, which is caused by obstruction from uterine enlargement and will lead to dilated pelvis calyces system and ureter. Increased fetal head pressure on urinary bladder will cause vesico-ureteral reflux. Progesterone also plays a role in the condition of decreased bladder contraction in which urinary retention will take place, as well as risk of bacterial growth and increased risk of UTI. Pregnant women also suffer from decreased ureter tone and peristaltic as well as increased risk of vesicoureteral reflux, which is caused by vesico-ureter valve incompetence, hence, inevitably pregnant women are more at risk suffer from UTI.[4,16]

A research conducted by Gusrianty et al. in subdistrict of Jatinangor, district of Sumedang, province of West Java suggested that the peak of incidence of UTI was the same as theory which was at 30th until 32nd week of pregnancy. At this gestational age group, progesterone is at high concentration and obstruction from uterine enlargement will lead to dilated pelvicocalyces system and ureter, thus pregnant women are quite susceptible to suffer from UTI at gestational age group 28-40 week.[4,16]

As opposed to previous findings, the research conducted by Edy Fakhrizal in Riau suggested that there was not found significant correlation between gestational age and UTI cases in pregnancy.[18] The contrary results were also found in other studies, Emiru et al. found that there was no significant correlation between gestational age and UTI cases in pregnancy.[3,19-21]

In this correlative research which was conducted in Primary Health Care Center Lempake, suggested that number of subjects who suffered from UTI at third gestational age group (first, second, and third trimester group) were not found in huge differences, respectively, where the first trimester group was the most one (4 subjects = 44.5%), followed by the third trimester group (3 subjects = 33.3%), and the second trimester group (2 subjects = 22.2%). The differences which were only 1 subject between each gestational age group, respectively, made the subjects distribution become unable to deliver better statistical analysis. However, it was found that the p-value at third-trimester group was significant, whereas the p-value at the second-trimester group was insignificant, then it still could be thought that there was influence of gestational age to UTI cases in pregnancy.

Because of total subjects who had positive result of bacteriuria only 9 subjects, then it will need further advanced research with larger amount of sample in order to gain better statistical analysis and able to reveal other risk factors which influence UTI cases in pregnancy.

CONCLUSIONS

Prevalence of UTI cases in pregnancy in Primary Health Care Center Lempake was 18.7 %. There was significant influence of maternal age to UTI cases in pregnancy, where maternal age group 26-35 years old was the most one suffering from UTI (positive result of bacteriuria) for about 55.6% and had tendency 5.4 times higher than maternal age group 16-25 years old to suffer from UTI in pregnancy. There was found significant influence on UTI cases in pregnancy at third-trimester group in Primary Health Care Center Lempake.

ETHICAL CLEARANCE

There is no ethical clearance because this research only collected data from the registry book of emergency unit in Primary Health Care Center Lempake, any further ethical clearance is not necessary.

CONFLICT OF INTEREST

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