

Full Length Research Paper

# Pregnancy outcomes: A comparison of women with symptomatic and asymptomatic bacteriuria in Cape Coast, Ghana

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Bacteriuria, whether symptomatic or asymptomatic, has been found to be associated with adverse pregnancy outcomes for the mother and the baby. This comparative study compared the maternal and perinatal outcomes of pregnancy between mothers with symptomatic and those with asymptomatic bacteriuria in pregnancy. The results showed that maternal outcomes (presence of foul smelling liquor, premature rupture of membranes, history of pregnancy-induced hypertension and previous abortion) were comparable between the groups. These outcomes did not exclusively depend on whether the pregnant women had asymptomatic or symptomatic bacteriuria. A positive association existed between symptomatic bacteriuria and gestational age (possibility of preterm or full term birth) while women with symptomatic bacteriuria were 7.3 times more likely to have preterm birth than women who were asymptomatic. Moreover, the Apgar scores at one minute and at five minutes were significantly associated with a presence of symptoms of bacteriuria in the mother. It is concluded that bacteriuria in pregnancy causes adverse obstetric outcomes and should be screened for and adequately treated.

**Key words:** Symptomatic bacteriuria, asymptomatic bacteriuria, pregnant women, pregnancy outcomes.

## INTRODUCTION

Globally, bacteriuria in pregnancy occurs in between 2% and 10% of pregnancies (Schoff, 2012), but is sometimes asymptomatic. Asymptomatic bacteriuria (ASB) is a subclinical infection, said to be present when the urine culture reveals the growth of pathogens greater than  $10^5$  bacteria/ml but without symptoms of UTI in the patient. Asymptomatic urinary tract infections (significant bacteriuria without obvious clinical manifestations) in pregnancy are not uncommon in Africa (Alfred, Chiedozie and Martin 2013). Several studies have shown varying prevalence rates even in the same country. This variation in the prevalence of asymptomatic bacteriuria is explained by differences in the population characteristics, differences in screening methodology and criteria for the diagnosis of asymptomatic bacteriuria in these studies.

(Alfred et al., 2013). For instance, studies in Nigeria revealed prevalence ranging from 10.7% (Awonuga et al., 2011) to 28.8% (Kehinde et al., 2011) and 40% (Ajayi et al., 2012) in the South West. They also reported between 18.2% (Oli et al. 2010) and 78.7% (Amadi et al., 2007) in the South East and between 13.8% (Alfred et al., 2013) and 45.3% in the South-South region (Imade et al., 2010). In Ghana, the prevalence has been found to be 7.3% in a tertiary health institution in Kumasi, (Turpin et al. 2007), 9.5% in the same hospital five years later (Obirikorang et al., 2012) and 56.5% in Cape Coast (Boye et al., 2012). In a related study in the Cape Coast Metropolis, Siakwa et al. (2014) found that 23.6% of pregnant women who had a positive urine culture did not have symptoms suggestive of urinary tract infection (UTI) at the time of testing. Most of these studies were conducted on account of the prevalence of asymptomatic bacteriuria and not on pregnancy outcomes. The present study characteristically considers this.

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History of previous urinary tract infections and low socioeconomic status (Schnarr and Smail, 2008; Shoff, 2012); advanced maternal age (Imade et al., 2010; Turpin et al., 2007); advanced gestational age and multiparity (Turpin et al., 2007), and increased sexual activity (Awonuga et al., 2011) have been suggested as risk factors for bacteriuria in pregnancy. However, Perera et al. (2012) in a study in Sri Lanka, found no significant association between bacteriuria and the risk factors previously described; and Alfred et al. (2013) using a private hospital in Benin City, Nigeria, found no relationship between ASB and socio-economic status.

Asymptomatic bacteriuria, when undetected and untreated, is associated with adverse obstetric and foetal outcomes both during pregnancy and during puerperium (Kehinde et al., 2011; Macejko and Schaeffer, 2007); specifically with increased risk of preterm birth, low birth weight, and perinatal mortality (Small and Vazquez, 2007). Symptomatic infection develops in 20-40% of those with asymptomatic bacteriuria and premature labor in 20-50% with symptomatic UTI (Goodman, 2009). Successful treatment of asymptomatic bacteriuria therefore, reduces rate of symptomatic UTI by 80-90% (Goodman, 2009). This is because pregnancy enhances the progression from asymptomatic to symptomatic bacteriuria. Proper screening and treatment of bacteriuria during pregnancy is therefore necessary to prevent these complications.

Shoff (2012) suggests that screening for ASB is a standard aspect of prenatal care and should be done at the first prenatal visit. Macejko and Schaeffer (2007) and Colgan et al. (2006) suggest that all women should be screened for bacteriuria in the first trimester, and treated if positive; and women with a history of recurrent urinary tract infections should have repeat bacteriuria screening throughout pregnancy. This is usually not done in many hospitals in Ghana. Although the condition-specific cost of asymptomatic bacteriuria in pregnancy is unknown, screening for these conditions in pregnant women is cost-effective as compared with treating UTI and pyelonephritis without screening. As a consequence and having already conducted a similar study on UTIs in pregnancy and birth outcomes (Siakwa et al., 2014), this follow up study seeks to compare the birth outcomes between pregnant women with symptomatic bacteriuria and those with asymptomatic bacteriuria.

## PATIENTS AND METHODS

This descriptive comparative study was conducted in the Cape Coast Teaching Hospital, the major tertiary health institution in the Central Region of Ghana. The Institutional Review Board of the University of Cape Coast approved the study.

### Recruitment of Patients

Two hundred and twenty (220) pregnant women who had

a positive urine culture in a previous study (Siakwa et al, 2014) were enrolled in the study to determine differences in birth outcomes between those who were symptomatic and those who were asymptomatic. Participants gave their consent in writing and were screened for any underlying renal pathology for exclusion and further categorized into symptomatic and asymptomatic on the basis of symptoms suggestive of urinary tract infection (e.g. urgency and frequency of micturition, dysuria, nocturia, flank pain and foul smelling odour of urine) at the time of collection of urine specimen. Socio-demographic, medical and obstetrical data were collected using a pre-tested checklist. Participants were monitored on each antenatal visit through their pregnancy until delivery and their babies were assessed for Apgar score at minute one and five, birth weight, prematurity and any abnormalities.

### Urine Specimen Collection and Analysis

Mid-stream urine samples were collected on each antenatal visit using sterilized bottles at the clinic. The urine samples were transported immediately to the clinical microbiology laboratory and analyzed within one hour. A standard calibrated quantitative loop (Cheesbrough, 2000) was used to inoculate urine sample on cysteine lactose electrolyte deficient Agar, MacConkey and Blood agar plates (OXOID-England) and incubated for 24hrs at 37°C. A diagnosis of UTI was

made when there were at least  $10^5$  colony forming unit (CFU)/ml of urine. All colonies were characterized using different tests conforming to standard diagnostic criteria.

### Data Analysis

Data were entered into the computer using SPSS for windows (version 16.0) and double checked before analysis. Means and proportions of the socio-demographic, medical, obstetrical and neonatal characteristics were calculated and compared between the symptomatic and asymptomatic groups using the student t-test and Chi-square test. Multivariate analysis was done with symptomatic/asymptomatic as dependent variables and socio-demographic, medical, obstetrics and neonatal variables as independent variables. Differences between means were considered statistically significant at  $p < 0.05$ .

## RESULTS

Out of the 220 pregnant women with bacteriuria who participated in the study, one hundred and sixty eight (76.4%) with mean age  $25 \pm 4.5$  years presented with symptoms of UTI while fifty-two (23.6%) with mean age of  $27 \pm 5.2$  years were asymptomatic.

More so, mean haemoglobin levels were recorded as

**Table 1.** Socio-demographic characteristics of symptomatic and asymptomatic mothers (n=220).

Parameters	Variables	Symptomatic (n=168)	Asymptomatic (n=52)	Chi Square	df	P- Values	Odd Ratio	CI Lower	Upper
Parity	1	102	41	5.672	2	0.059	0.294	1.458	
	2	37	10						
	≥3	19	1						
Educational Level	None	64	10	3	0.016	1.901	0.820	4.633	
	Primary	60	10.286						
	Secondary	25	11						
	Tertiary	19	13	2.781	1.0377	5.81			
Income Level	Low	124	30	7.449	2	0.024	0.659	3.337	
	Medium	30	11						
	High	14	3.227						
				1.300	7.890				

**Table 2.** Neonatal factors in symptomatic and asymptomatic mothers (n = 220).

Parameters	Variables	Symptomatic (n=168)	Asymptomatic (n=52)	Chi Square	df	P- Values	Odd Ratio	CI Lower	Upper
Gestational Age	Preterm	40	2	10.246	1	0.001	7.262	2.109	49.386
	Term	128	50						
Birth Weight	<2500g	50	12	0.877	1	0.349	1.400	0.691	3.009
	≥2500g	118	40						
Apgar Score at 1 min	< 7	68	3	21.884	1	0.000	10.533	3.653	46.299
	≥ 7	100	49						
Apgar Score at 5 min	< 7	53	1	18.816	1	0.000	20.495	4.345	47.012
	≥ 7	115	51						
Birth Outcome	Live birth	152	50	1.704	1	0.192	0.406	0.058	1.510
	Still birth	16	2						

11.1±2.4g/dl and 11.6±2.1g/dl for the symptomatic and asymptomatic respectively. Table 1 presents the socio-demographic characteristics of participants and reveals significant differences in educational level and socio-economic status between the two groups (significantly high odd ratios between groups). This means that educational and income levels are significantly associated with the possibility of having symptomatic bacteriuria in pregnancy. There was no significant association between parity and development of symptomatic bacteriuria in participants.

Table 2 shows neonatal outcomes, with a positive association between symptomatic bacteriuria and gestational age (possibility of preterm or full term birth). Women with symptomatic bacteriuria were 7.3 times more likely to have preterm birth than women who were asymptomatic. The Apgar score at one minute and at five minutes was significantly associated with a presence of symptoms of bacteriuria in the mother. At one minute the  $\chi^2$  of 21.88 and odds ratio of 10.533 ( $p = 0.0001$ ), show

that pregnant women with symptomatic bacteriuria were 10.5 times more likely to have babies with a lower (<7)

Apgar score at one minute than asymptomatic women. At 5 minutes, the  $\chi^2$  of 21.88 and odds ratio of 10.533 ( $p = 0.0001$ ) show that pregnant women with symptomatic bacteriuria were 20.5 times more likely to have babies with a lower (<7) Apgar score than asymptomatic women. Other factors (birth weight, birth outcome that is live birth/still birth) were not significantly related to whether the mother had symptoms of bacteriuria or not. This means that the birth weight and possibility of still birth were not determined by the presence or absence of symptoms of UTI during pregnancy (whether or not women have symptoms of the infection did not determine birth weight or occurrence of still birth).

Table 3 shows the maternal outcomes between pregnant women with symptomatic and asymptomatic bacteriuria. There was no association between the presence/absence of symptoms with the four factors analyzed thus; presence of foul smelling liquor (0.984), premature rupture of membranes (0.327), history of pregnancy-induced hypertension (0.899) and previous abortion (0.073).

**Table 3.** Maternal Obstetrical factors in symptomatic and asymptomatic mothers (n=220).

Parameters	Variables	Symptomatic (n=168)	Asymptomatic (n=52)	Chi Square	Df	P-Value	Odd Ratio	CI Lower	Upper																																
Foul liquor	Smelling Present	16	5	0.000	1	0.984	0.971	0.354	3.163																																
	Absent	152	47							Premature Rupture of Membrane	Present	30	6	0.959	1	0.327	1.563	0.643	4.445	Absent	138	44	HO/ PIH	Present	50	15	0.016	1	0.899	1.040	0.530	2.120	Absent	118	37	Previous Abortion	Present	16	1	3.217	1
Premature Rupture of Membrane	Present	30	6	0.959	1	0.327	1.563	0.643	4.445																																
	Absent	138	44							HO/ PIH	Present	50	15	0.016	1	0.899	1.040	0.530	2.120	Absent	118	37	Previous Abortion	Present	16	1	3.217	1	0.073	4.725	0.925	116.002	Absent	152	51						
HO/ PIH	Present	50	15	0.016	1	0.899	1.040	0.530	2.120																																
	Absent	118	37							Previous Abortion	Present	16	1	3.217	1	0.073	4.725	0.925	116.002	Absent	152	51																			
Previous Abortion	Present	16	1	3.217	1	0.073	4.725	0.925	116.002																																
	Absent	152	51																																						

## DISCUSSION

Untreated asymptomatic bacteriuria can lead to symptomatic urinary tract infection (UTI) in pregnancy with devastating maternal and neonatal effects (Kehinde et al., 2011). According to Mead (2011), the prevalence of pyelonephritis is higher in women with asymptomatic bacteriuria, especially if untreated (24.8%) and if treated (3.2%) and therefore concluded that the presence of asymptomatic bacteriuria is a risk factor for the development of pyelonephritis. Screening for asymptomatic bacteriuria in pregnancy is the standard of obstetric care (Smaill, 2007) because it ensures effective treatment which according to Schnarr and Smaill (2008), has been known to reduce the rate of pyelonephritis in pregnancy. However, effective treatment is difficult in some settings because some women do not experience symptoms of bacteriuria that would make them seek medical attention, and since routine prenatal screening is not done for bacteriuria in most hospitals in developing nations like Ghana and Nigeria not all women have urine taken for culture at booking. With the high prevalence of bacteriuria revealed in these two countries, obstetric care protocols/guidelines/policy during the antenatal period should include not only routine screening for bacteriuria right from the time of booking but also effective treatment of asymptomatic bacteriuria and routine monitoring for recurrence throughout pregnancy. This is not only cost effective (Turpin et al., 2007; Imade et al., 2010; Perera et al., 2012) but also optimizes patient outcomes (Mead, 2011).

The prevalence of asymptomatic bacteriuria in the sample used was 23.6% and was associated with educational and income levels of mothers. This is similar to studies by Schnarr and Smaill (2008). The risk for UTIs increases with low educational level, lower socioeconomic level and those with unsatisfactory personal hygiene and those who do not use cotton underwear (Olusanya et al., 1993; Hooton et al., 2010;

Dimetry et al., 2007 and Kovavisarach et al., 2009). A previous study by Siakwa et al. (2014) found that a good level of educational/income status significantly produced low bacteriuria and thus a lower incidence of symptomatic UTIs. In contrast, the present study reveals significant differences in educational level and socio-economic status between the two groups (significantly high odd ratios between groups). Thus, educational and income levels are significantly associated with the possibility of having symptomatic bacteriuria in pregnancy. There was no significant association between parity and development of symptomatic bacteriuria in participants. Whereas Turpin et al. (2007) found an association between parity and ASB, this study found no such association.

Some studies have reported several adverse maternal and perinatal outcomes like preterm delivery as a result of UTIs in pregnancy. This is consistent with our previous study in which UTIs were significantly associated with preterm delivery amongst other adverse maternal outcomes (Siakwa et al., 2014). This present study also affirms this as women with symptomatic bacteriuria are 7.3 times more likely to develop preterm deliveries than their asymptomatic counterparts.

Also the present study highlights lower Apgar scores at one and five minutes and these were also significantly associated with UTIs. This is also congruent with the findings of Siakwa et al. (2014).

## CONCLUSION

The outcome of this research provides useful insight into the dynamics between asymptomatic and symptomatic bacteriuria in pregnant women and the resultant progression into UTIs. An occurrence of asymptomatic bacteriuria is not necessarily a guarantee of a low risk of symptomatic bacteriuria since there is a need to treat asymptomatic bacteriuria cases in order to forestall sym-

ptomatic UTIs and ultimately adverse maternal /neonatal effects such as pyelonephritis and preterm deliveries. Socio-demographic parameters such as high literacy rates and economic empowerment have proven to help reduce the incidence of UTIs in pregnant women and respective neonates. Routine screening of all pregnant women for bacteriuria is thus highly recommended.

## CONFLICT OF INTEREST

The authors have no conflict of interest

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