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Original Research Article

Prevalence Of Urinary Tract Infections In Pregnant Women At AD-lucem Hospital In Bafang (West Cameroon)

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Abstract

Urinary tract infections are common in women, and even more so in pregnant women, not only because of the anatomical situation of their urinary tract, but also because of the anatomical and hormonal changes that occur with fetal growth. Urinary tract infections in pregnant women are associated with maternal-fetal morbidities such as hypertension, premature births, pre-eclampsia and low birth weight. The objective of our study was to determine both the frequency of germs isolated in the urine of pregnant women and their antimicrobial susceptibility profile. We conducted a descriptive, cross-sectional, prospective study over a six-month period from December 01er 2021 to May 31 2022 in the prenatal consultation services and clinical biology laboratory of the Ad-lucem Hospital in Banka-Bafang (West Cameroon). The urine was processed according to the standards of the microbiology reference system. At the same time, spreads were made for the realization of the fresh state between slides and slides and a urine strip with 11 parameters was made. Statistics was made by Epi info 7 and p□ 0, 05 was significative. A total of 210 pregnant women were enrolled in this study respecting our inclusion criteria. The most represented age group was 20-25 with a mean age of 29 ± 5 years. Our population was composed mostly of young people, all of whom were in school, most of whom, 41%, were housewives and 16% were students. The prevalence of urinary tract infections was 70.47%, and the most isolated germ was E. coli (39%). E. coli and Klebsiella were highly resistant to penicillin G and amoxicillin + clavulanic acid combination. Proteus strains showed resistance to Penicillin G (50%), Cefotaxime (50%). S.aureus showed good sensitivity to Lincomycin (100%), Ceftriazone (79.41%), Cefotaxime (88.23%) and Gentamicin (94.11%). A good sensitivity of Candida albicans to the tested antifungals was observed. In our study, urinary tract infection in pregnant women is asymptomatic in 49.32% and should be carefully investigated in the second trimester of pregnancy. Our study showed a very high prevalence rate of isolated germs at this stage of pregnancy, mainly enterobacteria with variable sensitivity to antibiotics.

1. Introduction

Urinary tract infection (UTI) is a contamination of the urinary tract (kidneys, ureters, bladder or urethra) by infectious agents. Urinary tract infections are the most common infectious diseases contracted by humans after respiratory diseases and are one of the most common infections encountered in hospital practice [1]**.** They affect patients of all ages and genders. In low-income countries such as Cameroon, the strip tests are performed in pregnant women (3 parameters and/or 11 parameters) in order to look for a certain number of elements such as proteins (suspicion of pre-eclampsia), sugar (suspicion of gestational diabetes) or the presence of leucocytes and/or nitrites (suspicion of urinary tract infection). While these less expensive tests provide guidance, it is still important to conduct cycobacteriological examinations of urine to determine which germs are isolated and how sensitive they are to antimicrobials. Due the proximity of the urinary tract, vagina and anus, women are more prone to urinary tract infections than men. Urinary tract infections are the most common bacterial infections during pregnancy. The risk increases during pregnancy because the uterus, which is located between the bladder and the rectum, grows and narrows the bladder forward, increasing the frequency of urination and limiting complete drainage of urine [2,3]. Hormonal changes increase urinary stasis and vesico-ureteral reflux and thus promote bacterial growth [4]. Urinary tract infections in pregnant women are associated with maternal and fetal morbidity such as preterm labor, hypertension/pre-eclampsia, pyelonephritis, low birth weight and prematurity.

At the Ad-lucem Banka-Bafang Hospital (West Cameroon), in order to establish an evaluative approach to the risk of infection in pregnant women and to propose treatment guidelines, we conducted a study with the objective of determining both the frequency of germs isolated in the urine of pregnant women and their antimicrobial susceptibility profile.

2. Materials and Methods

We conducted a cross-sectional and prospective descriptive study over a period of six months from 01 December 2021 to 31 May 2022 in the antenatal consultation services and clinical biology laboratory of the Ad-lucem hospital in Banka-Bafang (West Cameroon).We consecutively selected 210 pregnant women who met our inclusion criteria. The urine obtained was collected under pre-analytical conditions. The samples were seeded on CLED medium (Cystine, Lactose, Electrolyte, Deficient) for incubation at 37°c for 24 hours in aerobic conditions. At the same time, spreads were carried out for the realization of the fresh state between slides and lamellae and a urinary strip 11 parameters was made. 24 hours after incubation, the petri dishes were evaluated macroscopically and the identification was done using the Enterosystems gallery (Liofilchem®). As for the antibiogram, it was done by the technique of diffusion on agar by eliminating the antibiotics contraindicated in pregnant women.

3. Results and Discussion

3.1. Socio-demographic characteristics

A total of 210 pregnant women were enrolled in this study meeting our inclusion criteria. The most represented age group was 20-25 with a mean age of 29 ± 5 years, the minimum age was 16 years and the maximum age was 48 years (See Fig.1).

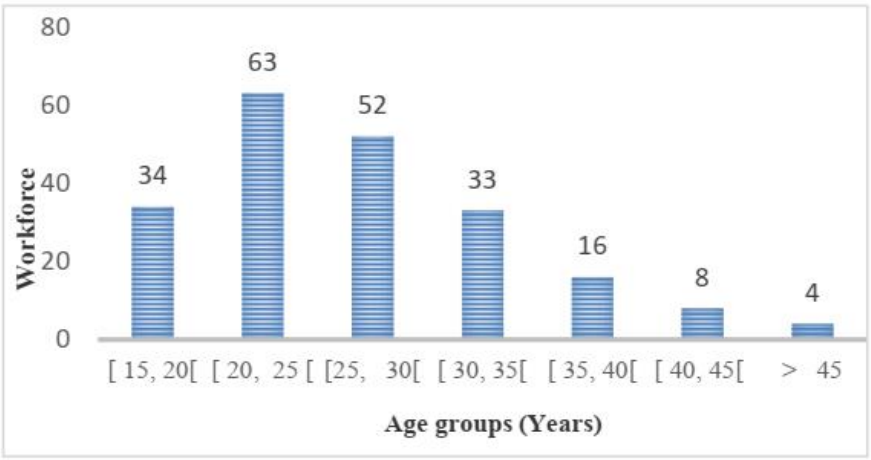

Figure 1. Distribution of the population by age group

The number of multiparous women was 58.18% while 70.81% of women had already given birth at least once. Our population was composed mainly of young people, all of whom were in school, most of whom, 41% were housewives and 16% were students (See Fig.2).

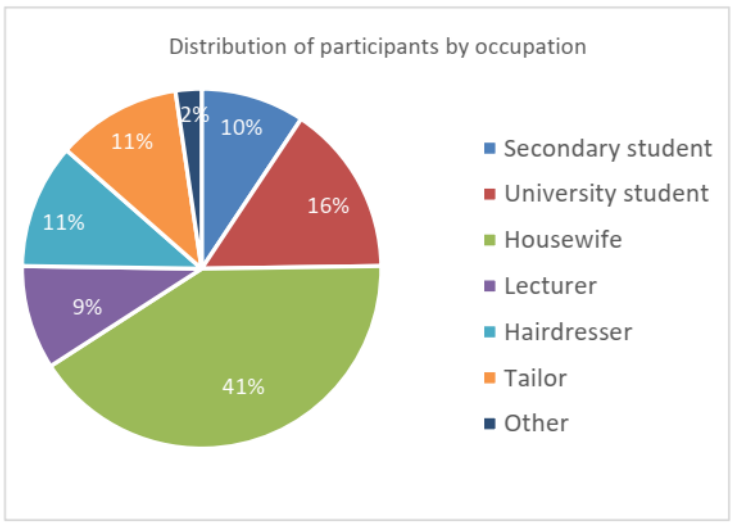

Figure 2. Distribution of participants by occupation.

3.2. Prevalence of urinary tract infections The prevalence of UTIs was 70.47% (see figure 3).

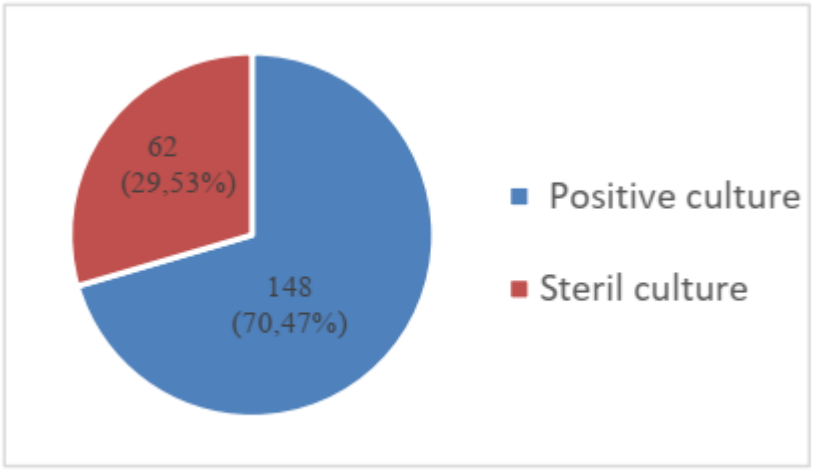

Figure 3. Distribution of the study population according to the culture results

This high prevalence was also found in a study by Turay et *al,* in 2014 in Nigeria which obtained a prevalence of 85% in pregnant women [5]. In Ethiopia in 2021, a more recent systematic review showed that out of 14 scientific articles, the prevalence rate of UTIs in pregnant women from 2007 to 2018 averaged 15.37%, with a peak at 26.6% [6]. In Cameroon, the prevalence of infection varies by region. In the regions close to the one where our study was conducted, namely the North-West and South-West, studies in 2012 showed prevalence rates equal to 65.9% in Buea and 54% in Bamenda [7]. In Buea, in 2021, a study by Ngong et *al.* Reported a prevalence rate of UTIs in pregnant women of 31% [8]. In other regions such as the Littoral, lower prevalence rates have been reported, this is the case of the study Tchente Nguefack et al., 2019 [9] which showed a prevalence rate of 9.9%.

3.3 Frequency of germs isolated in culture

The majority of the germs isolated were Gram-negative bacteria of the *Enterobacteriaceae* family (*E. coli*: 39%, *Klebsiella Spp*: 14.86%, *Proteus Spp*: 12.16%), Gram-positive bacteria (*Staphylococcus aureus*: 22.9%) and yeasts (*Candida albicans:* 10.13%). (See Figure 4).

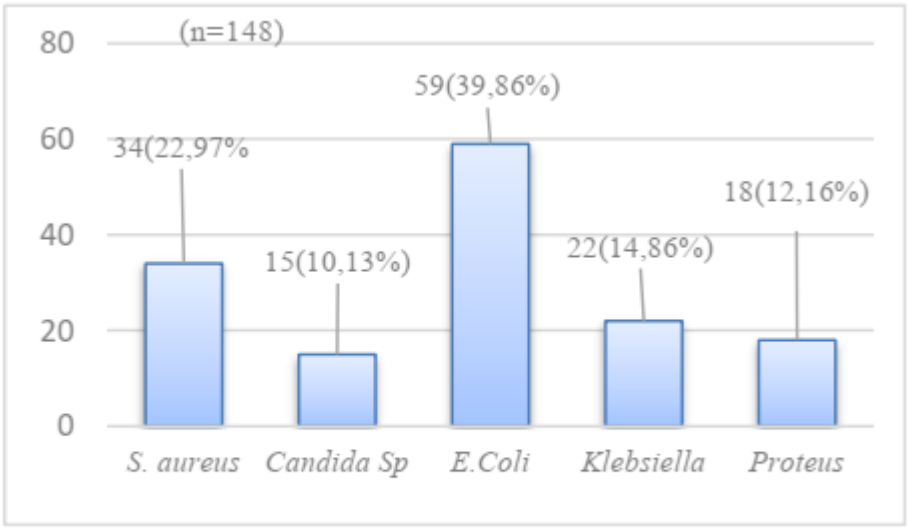

Figure 4. Frequency of germs isolated in culture

Several studies agree with us and *E. coli* remains the most isolated germ in the urine of pregnant women [5-10].

E. coli and *Klebsiella* were highly resistant to penicillin G and to the combination of amoxicillin + clavulanic acid (see Table 1).

3.4. Antibiotic susceptibility profile.

***Table 1**: Antibiotic susceptibility profile of the different bacteria isolated*

Antibiotics	Number in percentage of susceptible strains (%)			
	S. aureus	*E. coli*	*Klebsiella*	*Proteus*
Penicillin G	21 (61,76%)	19 (32,20%)	3 (13,63%)	9 (50%)
Amoxicillin + Clavulanic Acid	9 (26,47%)	6 (10,16%)	10 (45,45%)	3 (16,66%)
Cefotaxime	30 (88,23%)	48 (81,35%)	22 (100%)	9 (50%)
Ceftriazone	27 (79,41%)	54 (91,52%)	22 (100%)	16 (88,88%)
Gentamycin	32 (94,11%)	46 (77,96%)	17 (77,27%)	18 (100%)
Lincomycin	34 (100%)	57 (96,61%)	22 (100%)	18 (100%)
Erythromycin	14 (41,17%)	33 (55,93%)	10 (45,45%)	13 (72,22%)

On the other hand, they were highly susceptible to Ceftriaxone, Cefotaxime, Gentamicin and Lincomycin. Erythromycin was sensitive to about 50% of the *E. Coli and Klebsiella* strains. *Proteus* strains showed resistance to Penicillin G (50%), Cefotaxime (50%), and amoxicillin + clavulanic acid (83.34%) and good susceptibility to gentamicin (100%), Ceftriaxone (88.88%), Lincomycin (100%), and Erythromycin (72.22%). *S.aureus* showed good sensitivity to Lincomycin (100%), Ceftriaxone (79.41%), Cefotaxime (88.23%) and Gentamicin (94.11%). But showed very high resistance to penicillin G, amoxicillin + clavulanic acid and Erythromycin. A good sensitivity of *Candida albicans* to the tested antifungals was observed (See Table 2). Except for Amphotericin B and Nystatin which showed resistance of 100% and 53.34% respectively

Table 2. Antifungal susceptibility profile of Candida albicans strains.

Antifungals	Number in percentage of susceptible strains (%)
	Candida albicans
Miconazole	15 (100%)
Ketoconazole	12 (80,00 %)
Fluconazole	9 (60,00%)
Econazole	13 (86,66 %)
Nystatin	7 (46,66%)
Amphotericin B	0(0,00%)

3.5. Associated factors

3.5.1. Urine reactivity to nitrites

Urine reactivity to nitrites showed that there is a strong association (p=0.03) between nitrite result and microbial growth in culture (See Table 3)

Table 3.Distribution of microbial culture results by urine nitrite reactivity.

		Microbial culture			
		positive	negative	Total	P
Nitrite	positive	30	6	36	
	negative	118	56	174	0,03
Total		148	62	210	

However, out of 148 positive cultures, the nitrite test was concordant with only 30 cultures, i.e. a proportion of 20.27%. Our results are divergent from those obtained by Ngong et *al*. 2021 who showed a concordance of 100%. This discrepancy can be explained by the fact that all the germs that grew in culture in our study did not reduce nitrates to nitrites, unlike the study of Ngong et *al.* 2021[8] where 85.4% of the isolated germs were Enterobacteria. The nitrite test using the urine strip is therefore only useful if the infection is caused by bacteria that reduce nitrate to nitrite; a negative nitrite test should not exclude a possible infection.

3.5.2. Urine leukocyte esterase reactivity

Urine leukocyte esterase reactivity (see Table 4) also showed a strong association with microbial culture results (p= 0.0055).Indeed in our study, leukocyturia and microbial growth were at 58.11% (86/148). Our results converge here with those of Ngong et *al*, 2021 where the concordance was 48.30% [8].

Table 4. Distribution of microbial culture results by urine leukocyte esterase reactivity

		Microbial culture			
		positive	negative	Total	P
Leukocyte esterase	Positive	86	24	110	0,0055
	Negative	62	38	100	
Total		148	62	210	

The leukocyte strip test therefore offers a better indication than the nitrite test, and this is explained by the fact that the majority of isolated germs, when they are responsible for urinary infections, cause inflammation.

3.*5.3. Relationship between signs and symptoms and microbial growth*

We observed a statistically significant relationship (P=0.003) between signs and symptoms and microbial growth (See Tab 5 and 6), in fact, 50.68% of the patients with positive cultures had at least one symptom which was either burning urination (60%) or pelvic pain (40%).

Table 5. Distribution of microbial culture results by symptoms

		symptoms	No symptoms	Total	P
Microbial culture	Positive	75	73	148	0,003
	Negative	44	18	62	
Total		119	91	210	

Table 6.Distribution of microbial culture results by symptom type

Microbial culture		Burning of the bladder	Pelvic pain	Total	P
Microbial culture	Positive	45	30	75	0,01
	Negative	16	28	44	
Total		61	58	58	

In comparison to the study of Ngong et *al.* 2021, although these results were not significant (P=0.44), they nevertheless showed a prevalence of symptomatic patients of 33.6%.

4. Conclusion

In our study, urinary tract infection in pregnant women is asymptomatic in 49.32% of cases and should be carefully investigated in the second trimester of pregnancy. Our study showed a very high prevalence rate of isolated germs, mainly enterobacteria, with variable sensitivity to antibiotics at this stage of pregnancy. The presence of nitrites and/or leukocytes are factors that may point to a urinary tract infection but must always be accompanied by a microbial culture in pregnant women in the second trimester.

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