

A Study On Prevalence Of Urinary Tract Infection In Hypertensive Patients Attending An Urban Hospital In Lagos, Nigeria

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ABSTRACT

Three hundred and fifty four hypertensive patients in the age range 20 - 80 years were studied. They included both old and new patients who were attending the clinic for the first time or had been patients for up to 27 years. The 298 age-matched non-hypertensive controls were also studied.

The booking mean arterial pressure (mean arterial pressure at first attendance or at booking for the clinic) and the study mean arterial pressure (mean arterial pressure taken during the period of study) were recorded and patients were classified as normotensive MAP <110mmHg, mildly hypertensive 110 - 122mmHg, moderately hypertensive MAP 123 - 136mmHg and severely hypertensive MAP > 137mmHg. At booking there were significantly more male moderate and severe hypertensives than females.

Symptoms of UTI were elicited by indirect questioning and midstream urine specimens collected. There was no statistically significant difference in UTI between male and female patients versus controls. A total of 13 out of 116 male patients and 47 out of 178 female patients had their urine samples positive for urinary pathogens.

It was significant that most cases had asymptomatic bacteriuria. *Escherichia coli* was the most frequent organism isolated in both patients and controls but its distribution in patients on gender basis was not significantly different. However, in controls, the frequency in female controls was significantly higher than in male controls, but the frequency was not significantly different in all patients versus all controls.

It is concluded that the prevalence of UTI in our hypertensive population is not significantly different from that in the general population. That *E. coli* was the most frequent organism isolated, and that UTI occurred irrespective of the degree of hypertension nor did it affect significantly the course of the disease in the population studied.

INTRODUCTION

Urinary tract infection (UTI) is the commonest of all bacterial infections affecting humans throughout their life span. Twenty to thirty five percent of all females experience at least one episode of UTI sometimes in their lives. It affects all ages but has a particular impact on females of all ages, males at the two extreme of life, renal transplant patients and anyone with functional or structural abnormalities of the urinary excretory system¹. It produces a range of clinical effects ranging from pyelonephritis to asympto-

matic bacteriuria and even the so called symptomatic abacteriuria¹.

A coherent approach to the problem of UTI is essential particularly when it is chronic and as it relates to hypertension and end stage renal failure. There have been controversies on the effect of UTI on renal structure and function but from various studies²⁻⁷, it appears that the controversies are now rested. It has been suggested that in about one third of adult cases, UTI played an important secondary role only when super-imposed on primary abnormalities such as anatomical lesion, calculus disease or a lesion due to analgesic abuse. Thus in adult, there is little evidence that UTI per se leads to progressive renal damage²⁻⁷.

It is with this view that the authors decided to determine the prevalence of UTI in our hypertensive patients, the common organisms, to compare with non hypertensives and apparently healthy subjects and to determine if possible, predisposing factors and establish preventive measures. There is a dearth of information in the literature on the incidence and prevalence of UTI in our hypertensive population and healthy subjects.

The findings in this study may provide up-to-date information.

SUBJECTS AND METHODS

The study involved 129 male, 225 female hypertensives, 139 male and 159 female non hypertensive controls of comparable ages, the ages ranged 20 - 80 years. The patients were routinely attending the hypertensive clinic at LUTH and the controls were apparently healthy subjects and patients attending the respiratory or gastroenterology clinics at LUTH. The period of attendance ranged from the first time seen at the study period to about 27 years duration. The patients had been on pharmacologic and/or non-pharmacologic antihypertensive agents.

A complete clinical examination was carried out on both the patients and controls before they were enrolled in the study. At the beginning of the study period, the blood pressure of all patients were taken sitting and standing. For old patients the recorded blood pressure at their first attendance of booking was extracted from the case files.

The mean arterial pressure was calculated for each patient. The mean arterial pressure at first attendance or at booking was recorded as the booking mean arterial pressure (BMAP). The mean arterial pressure at study time was taken as the study mean arterial pressure (SMAP). For analysis, the mean arterial pressure (MAP)

was calculated from the diastolic blood pressure (DBP) + 1/3 systolic blood pressure (SBP) minus diastolic pressure (DBP). The patients were classified as normotensives, mild hypertensives, moderate hypertensives and severe hypertensives according to the new classification by the consensus group^{8,9} on guidelines for management of hypertension in Nigeria. The hypertension was staged as MAP 110 to 122mmHg as mild, 123 to 136mmHg as moderate and >137mmHg as severe. Patients with secondary hypertension or known cause of the hypertension were excluded. The study involved clinical assessment and microbiologic analysis of midstream urine specimens. Consent were obtained after adequate explanation for the study and full comprehension by all participants. The procedure for obtaining the midstream urine specimens was clearly explained and comprehended. Features of urinary tract infection were elicited by indirect questioning and on clinical examination.

The midstream urine specimens collected into sterile universal bottles were obtained after cleansing of the external genitalia from front to back with sterile water and without the bottles coming into contact with the skin. The specimens were transported immediately to the microbiology laboratory when feasible or refrigerated at 4°C and transported within two hours of collection.

MICROBIOLOGICAL ANALYSIS

All samples were processed immediately or were kept in the refrigerator at 4°C and processed within 4 hours of collection.

The urine was examined macroscopically for colour and turbidity. The microscopy of the urine deposit was also carried out to determine the presence of pus cells, red blood cells, casts and crystals. All samples were cultured on nutrient agar (Oxoid) plus 5% human blood and MacConkey's agar. Significant bacteriuria was determined by the standard wireloop (0.01ml) method. Cultures plates were incubated at 37°C in air for 18–24 hours. All cultures showing significant growth (>10⁵ cfu/ml) were further characterized and identified by standard biochemical methods¹⁰.

The susceptibility of the isolates to various antibiotics (penicillin, streptomycin, erythromycin, chloramphenicol, tetracycline, ampicillin, cloxacillin, ofloxacin, ampicillin, nalidixic acid, ciproxacin, nitrofurantoin, pefloxacin, cotrimoxazole, ceftazidime, ceftriaxone and colistin was tested using the Kirby Bauer method. The reference strain *E. coli* (ATCC 25922) was used as control.

STATISTICAL ANALYSIS

The results were collated and statistically analysed using Chi square and student t test with p value of <0.05 taken as level of significance.

RESULTS

Table I shows the mean age in male and female patients and controls. No statistically significant differences in mean ages between male versus female patients, male versus female controls, male patients versus male controls, female patients versus female controls and all patients versus all controls.

The mean booking mean arterial pressure (BMAP) in male patients was 130.8 ± 14.0mmHg and it is significantly higher than 125.8 ± 12. 4mmHg in female patients (p < 0.001). Mean study mean arterial pressure (SMAP) in males 118.1 ± 16.6mmHg versus 116.6 ± 16.8mmHg in females are not statistically different (p > 0.05) (Table II).

It should be noted that 13 out of 116 male patients, and 47 out of 178 female patients had their urine samples positive for pathogens. Observed differences in distribution of positive cultures in mild, moderate and severe hypertensives in male versus female patients were not statistically significant (Table III). X² = 2.12 P > 0.05

It was found that 4 male normotensive subjects and 9 male hypertensive patients had urine – culture positive while 15 females normotensive subjects and 32 female hypertensive patients were positive for urinary tract pathogens.

The observed differences in distribution of positive and negative cultures in all patients versus all controls were not statistically significant (Table IV). X² = 1.16 p > 0.05.

Escherichia coli was the commonest urinary pathogen isolated from either the hypertensive patients or the controls. There were 23 urinary isolates of *E. coli* from hypertensive patients, while all other urinary pathogens were 37 isolates. From all the controls there were *E. coli* 19 isolates while others were 23 isolates.

Table I
Mean Age in Male and Female Patients and Controls

	Male	Female	P value
Patients	n = 129	n = 225	P > 0.05 NS
Mean age	54.6	54.9	
±sd (years)	±10.6	±11.2	
Range (years)	25–77	26–82	
Controls	n = 139	n = 159	> 0.05 NS
Mean age	54.9	52.6	
±sd (years)	±12.4	±12.0	
Range (years)	25–79	27–78	
P value	>0.05 NS	>0.05 NS	

NS = Not Significant

Table II
Mean of booking mean arterial pressure (BMAP) and mean of study mean arterial pressure (SMAP) in Male and Female Patients

	Male n = 129	Female n = 225	P value
Number			
BMAP	130.8	125.8	<0.001 S
±sd (mmHg)	±14.0	±12.4	
Range	117–193	110–182	
SMAP	118.1	116.6	> 0.05 NS
±sd (mmHg)	±16.6	±16.8	
Range	80–157	72–187	

S = Significant
NS = Not significant

Table III

The number of positive cultures in male mild (MIHPT) Moderate (MOHPT) and severe hypertensives (SHPT) Versus Female MIHPT, MOHPT and SHPT

	MIHPT	MOHPT	SHPT	Sum
Male	2	8	3	13
Female	17	19	11	47
Sum	19	27	14	60

$\chi^2 = 2.12$ P >0.05 Not significant

Table IV

The number of Positive and Negative cultures in all Patients Versus all Controls

	Patients	Controls	Sum
Positive Cultures	60	42	102
Negative Cultures	294	256	550
Sum	354	296	692

$\chi^2 = 1.16$ P > 0.05 Not significant

DISCUSSION

In Nigeria, information regarding the prevalence of UTI and its effect on renal anatomy and function has been scanty nevertheless chronic pyelonephritis as a cause of end stage renal failure in our environment is uncommon. Our experience is that primary hypertension and glomerulopathy are the two commonest causes. With more stringent criteria for pathologic diagnosis of UTI several workers in the 1960s began to question the hypothesis that uncomplicated UTI could lead to progressive renal damage^{2,3}. Murray and Golberg⁴ reported the absence of infection in their retrospective study of interstitial nephritis in the hospital of University of Pennsylvania between 1969 and 1973. Freedman and Andriole⁵ followed 250 women with UTI for up to 12 years and found no evidence of deterioration in renal function or blood pressure elevation. Similarly, Asscher⁶ studied 107 women with bacteriuria and 88 matched controls over a period of five years and found that uropathy was not associated with progressive renal dysfunction. Freeman⁷ prospectively studied 249 men with bacteriuria for up to 10 years and found no deterioration in renal function in the absence of severe urologic disease or concomitant non infective renal disease. Thus in adults, there is little evidence that uncomplicated UTI leads to progressive kidney damage.

In our study, we found predominantly asymptomatic bacteriuria as only 3 female patients volunteered symptom of dysuria. The percentage of patients with asymptomatic bacteriuria or positive culture was only 16.9% which was not significantly different from 14.1% in controls. The positivity of the cultures was not proportional to the degree of hypertension and there was no significant difference in culture positivity between normotensives patients and

hypertensive patients. The commonest organism in both patient and control populations was *E. coli*.

In this study, although renal function was not assessed either by clearance study or by urography, it is unlikely that asymptomatic bacteriuria would have any untoward effect. From this study, we conclude that the prevalence of UTI in hypertensive population is not significantly different from the prevalence in general population. That *E. coli* remains the commonest organism in urinary tract infection. That the course of the hypertension has not been adversely affected by UTI and that uncomplicated UTI is unlikely to cause progressive renal damage.

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