

URETHRAL MUCOSA PROLAPSE IN ILORIN: A 12-YEAR STUDY (1988-1999)

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SUMMARY

Over a 12-year period (January, 1988 – December 1999), a prospective study was carried out on 43 patients with urethral mucosa prolapse managed at the University of Ilorin Teaching Hospital (UITH), Ilorin.

The patients were aged mostly between 3 and 12 years and the commonest complaint was bleeding per vaginam (83.7%) closely followed by dysuria (41.9%). All the patients were Africans and were treated surgically with postoperative complications of urinary retention (11.6%) and dysuria (7.0%). There was no urethral stricture or recurrence of the mucosa prolapse in the post-operative one year follow-up period.

The differential diagnosis and pathological changes of the disorder are discussed.

KEY WORDS Prolapsed urethral mucosa, Management, Ilorin, Nigeria.

INTRODUCTION

Urethral mucosa prolapse¹ is a circumferential protrusion of the urethral mucosa through the external urethral meatus. The condition can occur at any age even in postmenopausal women, but is reported to be most common in girls aged between 6 months and 10 years¹⁻¹⁰. When the mucosa prolapse through the external urethral orifice, it forms a deep red or bluish tumour which swells and becomes oedematous and sometimes gangrenous. This could be infected if left untreated. The extruding mass is tubular and is lined within as well as without by a sensitive, easily bleeding mucous membrane. When infected there could be marked erythema and induration and could be puzzling to those who see it for the first time.

Prolapsed urethral mucosa is said to be severe in children and aged women but fairly mild in women within the reproductive age group^{4,9,11-15}. The aetiology of this disorder is unknown but congenital or acquired weakness or atrophy or loosening of the mucosa from its submucous attachments, bladder infection, excessive straining, trauma, varices and intraurethral polyp have been postulated as possible aetiological factors^{2,5,8,12,16}. However in most cases of urethral mucosa prolapse, no predisposing factor can be found and often there is little or no urinary symptoms; the lesion only discovered when the mother observes some blood stain on the girl's under clothing.

The objective of this study is to highlight the

commonest age group of this lesion/disorder in our own environment, the clinical presentations, the possible associated pathological changes, the differential diagnosis and the management.

MATERIALS AND METHODS

Over a twelve-year period, 1st January, 1988 to 31st December, 1999, a prospective study was carried out on 43 patients with urethral mucosa prolapse managed at the University of Ilorin Teaching Hospital (UITH), Ilorin, Nigeria.

All the patients were hospitalised. On admission each patient or the parents were interviewed with emphasis on age, presenting complaints, mode of onset and duration of complaints.

Following the interview the patients were examined with particular attention to the genitalia, the packed cell volume (PCV) estimated, blood grouping and cross-match were done where necessary. Those with dysuria and or

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vaginal discharge had their urine and vaginal swab specimens taken and sent to the laboratory for microscopy, culture and drug sensitivity of any infective organism and the appropriate antibiotics given where necessary.

Each patient had surgical excision of the prolapsed mucosa. The surgery was performed under general anaesthesia with the patient in the lithotomy position. Under aseptic condition, the urethral lumen was first identified in the prolapsed mass. A Foley's catheter was introduced through the lumen and with this as a guide, 4 strands of stay sutures were applied – first from side to side and then from anterior to posterior – to the protruding urethral mucosa using 2/0 chromic catgut on atraumatic needle, to facilitate the mobilisation of the mucosa from the urethral orifice. The redundant mucosa distal to the stay sutures was then excised with a pair of scissors and the edges sutured to the skin of the adjoining vestibule, and adequate haemostasis secured. The removed mucosa specimen was sent to the laboratory for histopathology while the catheter was left in situ for 24 hours before removal. Patients were usually discharged home 24 hours post-operative. Each patient was followed up in gynaecology clinic for a year.

During the one-year follow-up period of each patient's complications, like urinary retention, dysuria, stricture of the urethral meatus and recurrence of the mucosa prolapse, if any, were documented.

RESULTS

During the study period, January, 1988 – December, 1999, a total of 43 cases of urethral mucosa prolapse were managed in our centre out of a total of 3,792 gynaecological admissions for the same period, giving an incidence of 1.13% for our centre, indicating the uncommon nature of this gynaecological disorder in Ilorin.

Table 1 shows the age distribution of the patients with urethral mucosa prolapse. Most of the patients (23 or 51.2%) were aged between 5 and 7 years while 7 (16.3%) were in the 3-4 year age group, the youngest being 3 years. The oldest patient was a 29-year old nullipara who presented with a history of dysuria with occasional bleeding per vagina for 8 years.

Bleeding per vagina was the commonest symptom presented by the patients, accounting for about 83.7% of the cases (Table 2), while some patients presented with multiple symptoms.

TABLE I: Age of patients with urethral mucosa prolapse.

Age (Years)	No. of patients (%)
3-3.9	4(9.3)
4-4.9	3(7.0)
5-5.9	12 (27.9)
6-6.9	10 (23.2)
7-7.9	4 (9.3)
8-8.9	4 (9.3)
9-9.9	1 (2.3)
10-10.9	2 (4.7)
11-11.9	2 (4.7)
12-12.9	-
13-13.9	-
>14	1 (2.3)
Total	43 (100)

TABLE II: Symptoms of patients with urethral mucosa prolapse.

Symptoms	No. of patients
Recurrent vaginal bleeding	10
*Recurrent vaginal bleeding and	
Vaginal mass	7
Vaginal mass	5
Acute profuse vaginal bleeding	13
*Vaginal bleeding and dysuria	6
*Frequent micturition and offensive vaginal discharge	8
Dysuria	4
*Dysuria and swelling at vulva	8
Blood-stained urine	5

* N/B Some patients presented with multiple symptoms.

As shown in Table 3, patients with bleeding per vagina (83.7%) reported much earlier (within two weeks) in the hospital than others. Some patients' symptoms lasted months and even years before hospital consultation.

TABLE III: Duration of symptoms before consultation.

Symptoms	Duration	No. of patients
Vaginal bleeding	1-14 days	36 (83.7%)
Growth (mass) in vagina	2 weeks - 6 months	1 (2.3%)
Blood-stained urine	4 weeks - 2 years	1 (2.3%)
Mass at vulva	3 months - 1 years	1 (2.3%)
Dysuria	6 months - 8 years	2 (4.7%)
Total		43 (100%)

All the patients had surgical excision of the mucosa, prolapse and Table 4 shows the post-operative complications. 5 patients (11.6%) had urinary retention as against 3 patients (7.0%) with dysuria, while 35 patients (81.4%) had no complications.

TABLE IV: Post-Operative complications

Complications	No. of patients
No complications	35 (81.4%)
Dysuria	3 (7.0%)
Urinary retention	5 (11.6%)
Urethral stenosis	-
Recurrence of prolapse	-
Total	43 (100%)

DISCUSSION

Urethral mucosa prolapse is not a common gynaecological disorder in our centre in Ilorin as shown in this study. The incidence in our centre is 1.1% which tallied with the previous reports^{2,3,6,7,12,15}. The patients presented in this report fell within the age group in which prolapsed urethral mucosa is most common. The youngest patient in this report was 3 years which is at variance with those of other authors.^{1,2,3,5,6}

Prolapsed urethral mucosa may be asymptomatic but in this report, the patients' predominant symptom was bleeding per vaginam, accounting for 83.7% of the cases and is in agreement with other reports^{1,2,3,6,12,16}. Other symptoms included dysuria, frequent micturition, mass in the vagina or at the vulva and occasional blood-stained vaginal discharge which may be due to the breakdown and sloughing off of the congested prolapsed mucosa.

Acute urinary retention reported by some authors^{2,3,7,10,17} was not encountered in any of our patients pre-operative. Some of our patients presented with multiple symptoms unlike the cases reported by some other workers^{3,6,15,16}.

The precise aetiology of urethral mucosa prolapse is unknown^{1,2,11,16} but it is believed that while the rest of the urethra remains in its normal position, the mucosa becomes loosened from its submucous attachments and is gradually extruded at the external urethral orifice as a cherry red or cyanosed tumour^{2,5,8}. Bladder infection, excessive straining, trauma, varices or atrophy of the supporting tissues of the distal urethra (which may be congenital or acquired) and intraaurethral polyp, weakness of the urogenital diaphragm in asthenic girls, congenital defect of adhesion between the mucous and submucous membranes and increased intraabdominal pressure during physical activities have been postulated as possible aetiological factors^{1,9-12,16}. However in most cases of urethral mucosa prolapse, no predisposing factor can be found and often there is little or no urinary symptoms; the lesion only discovered when the mother observes some blood stain on the girl's under clothing.

In the cases presented in this report, no precise aetiological factor could be elicited other than possible bladder infection in 18 patients (41.9%) who presented with dysuria. Most parents gave misleading informations of rape and introduction of sharp objects into the patients' vagina by the school mates or by play mates as possible causes of the bleeding per vaginam. Hence the necessity for thorough examination.

In long standing cases of prolapsed urethral mucosa where infarction, infection and sloughing off of tissue have occurred, the diagnosis may not be easy particularly if one is seeing such a case for the first time. Thus other possible vaginal lesions which may be confused with this disorder should always be borne in mind. A prolapsed cervix may give the same picture of a vulva mass with bloody vaginal discharge. In this case, the intact urethral orifice will be easily identified. In precocious puberty, the vaginal bleeding will be cyclical rather than just bloody vaginal discharge and other features of puberty may be obvious. Genital infections in children like vulvovaginitis or foreign body in the vagina can give rise to a bloody offensive vaginal discharge but there may not be any vulva swelling. A malignant lesion like sarcoma botryoides (embryonal rhabdomyosarcoma) which is common in children below two years, can also occur at any age during childhood^{1,3,18,19} and the presenting symptom may be bloody discharge per vaginam with vulva mass. It is necessary to always remember this because the condition is lethal.

Other fungating neoplastic vulva masses, especially if centrally located, can mimic urethral mucosa prolapse^{1,2,19}. However, when in doubt, the urethral orifice within the circumferential mucosa eversion of the prolapsed mass can be identified either by observation during voiding or by catheterisation. Catheterisation was most commonly used in the cases presented in the paper.

The management modalities of prolapsed urethral mucosa can be surgical or medical (conservative). The basis of conservative or medical management is the eradication of infection and reduction of oedema in the exposed denuded mucosa with the hope of spontaneous resolution of the prolapse. It involves bed rest, intense local hygiene, frequent sitz baths with antiseptic solution, topical application of antimicrobial agents and oral antibiotics. Local hygiene decreased surface contamination and prevents reinfection from the perineum. The addition of topical application of oestrogen cream will also aid the cornification of the mucosa thus rendering it more resistant to bacterial reinvasion^{3,5,8,12,15,16}.

The surgical treatment range from simple excision to bladder wall suspension but these have been found not to yield the desired result, with the risk of bladder damage, haemorrhage and a high recurrence rate. To minimise bleeding and to produce a firm scar which may prevent a recurrence of the prolapse, some authors have recommended excising the redundant mucosa with diathermy or by cryocautery. This has been considered unnecessary as it may cause too much fibrosis and urethral stenosis at the orifice^{2,3,13,16,18}.

Excision of the prolapsed mucosa and stitching the edges to the adjoining skin of the vestibule is now the most preferred method. This is the method used in the cases presented in this report. With good surgical technique, haemorrhage, stricture formation and recurrence are preventable. It is also less invasive with reduced risk of damage to the adjacent tissue of the vestibule. There was no recurrence of the prolapsed mucosa in this study contrary to the 6.9% recurrence rate reported by some authors⁴ and a 24-28% failure rate with conservative (medical) treatment^{3,11,15,17}. The excised tissues sent to the laboratory in this study showed benign lesions on histological examination.

In conclusion, urethral mucosa prolapse is not a common gynaecological disorder but is more common in children than adults in our centre. It is an easily treatable condition surgically and if it is not to be missed, a high index of suspicion is required.

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REFERENCES:

1. Hill NCW, Oppenheimer LW, Morton KE: The aetiology of vaginal bleeding in children. A 20-year review. *Br J Obstet Gynaecol* 1989; 96: 467-469.
2. Stewart DB: Lesions of the urethra; In: Lawson JB and Stewart DB (Eds) *Obstetrics and Gynaecology in the tropics and developing countries*. 1st Edition (8th reprint 1983). London. The English Language Book Society and Edward Arnold (Publishers) Ltd 1967; 1983: 529-542.
3. Rudin JE, Geldt VG, Aleseev EB: Prolapse of Urethral Mucosa in white female children: Experience with 85 cases. *J Pediatr Surg* 1997; 32 (3): 423-425.
4. Rock JA: Surgical conditions of the vagina and urethra. In: Rock JA (Ed) *The Linde's operative gynaecology* 7th Edition, JB Lippincott company, Philadelphia and Toronto 1992: 1137-1139.
5. Cardozo L: Urinary Incontinence and other disorders of the lower urinary tract in women. In: Whitfield CR (ed) *Dewhurst's textbook of Obstetrics and Gynaecology for postgraduates* 5th Edition (reprinted 1996). Oxford, London, Edinburgh, Melbourne. Blackwell Scientific Publications, 1995; 1996: 653-680.
6. Poleorny SF: Urethral prolapse, prepubertal vulvovaginitis. *Obstet Gynaec Clinics of North America* 1992; 19: 39-58.
7. Kisanga RE, Aboud MM: Urethral mucosa prolapse in young girls. *Cent Afr J Med* 1996; 42 (1): 31-33.
8. Pouya M, Van-Cangh PJ, Wese FX, Opsomer FJ, Saleh M: Mucosa prolapse of the urethra. *Acta Urol Belg* 1995; 63 (4): 23-29.
9. Caprano VJ, Bayonet Ruyer NP, Magoss I: Vulva tumour in children due to prolapse of urethral mucosa. *Am J Obstet Gynaecol* 1970; 108: 572-575.
10. Neurvirth RS: Urethral prolapse: A cause of vaginal bleeding in young girls. Report of 5 cases. *Obstet Gynaecol* 1963; 22: 290-292.
11. Harris RL, Cundiff GW, Coates KW, Addison WA, Bump RC: Urethral prolapse after collagen injection. *Am J Obstet Gynaecol* 1998; 178(3): 614-615.

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12. Tindall VR: Urethral tumours. In: *Jeffcoate's principles of Gynaecology*, 5th Edition, Butterworths and Co. (Publishers) Ltd. London and Boston, 1987: 384-385.
13. Howkins J, Hudson C: Surgical treatment of diseases of the urethra. In: Howkins J and Hudson C (Eds) *Shaw's textbook of operative gynaecology*, 5th Edition, Churchill Livingstone, London, 1983; p. 199-207.
14. Kleinjan JH, Vos P: Strangulated urethral mucosa prolapse. *Urology* 1996; 47 (4): 599-601.
15. Jenkins GR, Vecheck K, Noe N: Treatment of girls with urethral prolapse. *J Urol* 1984; 132: 732-734.
16. Carlson NJ, Lane JM, Samir NH: Urethral prolapse in the premenarcheal female. *Int J Gynaecol* 1987; 25: 69-74.
17. Richardson DA, Hiji SN, Herst AL: Medical treatment of urethral prolapse in children. *Obstet Gynaecol* 1982; 59: 69-74.
18. Mitchell GW: The urinary tract as related to Gynaecology. In: Danforth DN, (Ed). *Obstetrics and Gynaecology*, 3rd Edition. Medical Department, Harper and Row Publishers, Hagerstown Maryland, 1982. P. 114-121.
19. Dewhurst J: Genital Tract Malignancy in the prepubertal child. In: Coppers D (Ed.) *Gynaecologic Oncology*, 1st edition, Vol. 2, Churchill Livingstone, London, 1981; p. 775-783.

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“If a man repeats a lie over
and over, he will eventually
accept the lie as truth”.

- Napoleon Hill

TABLE IV: Comparison of efficacy of antimicrobial agents between pregnant and non-pregnant patients.

Antimicrobial agent	% Effectiveness		P-Value
	Pregnant patients	Non-pregnant patients	
Penicillin	3.1	3.6	0.05 > p > 0.001
Ampicillin	7.3	5	
Cloxacillin	16.7	8.3	
Sulfamethoxazole	46	40	
Erythromycin	23.7	20	
Azithromycin	70.0	61.6	
Tetracycline	15.8	6.7	
Chloramphenicol	18.8	17.9	
Streptomycin	28.7	24	
Gentamycin	67.4	55	
Ofloxacin	81.2	79.5	
Ciprofloxacin	89.2	85.4	
Cefuroxime	95.8	90.4	
Ceftriaxone	93.9	87.8	
Cotrimoxazole	57.9	50.0	
Nitrofurantoin	69.7	68.8	
Nalidixic acid	64.3	59.4	

P < 0.05 for difference between pregnant and non-pregnant women.

DISCUSSION

The 47% rate of significant bacteriuria reported in this study is far higher than rates reported in other studies^{1,2,5}. It may however be due to the fact that the rate obtained in this study was based on population with clinical suspicion of urinary tract infections UTIs, as against the other studies that were based on a large population of clinic attendance or hospital admissions. This is apart from the fact that significant (profuse) growth of *Candida albicans* and *Trichomonas vaginalis* were included in the positive samples. The preponderance of positive pregnant patients samples is however in keeping with the predisposing

structural and functional changes in the urinary tract brought about by pregnancy itself^{7,8}.

The commonest organism isolated was *Escherichia coli*, accounting for 31.6%. This finding conforms to the generally observed trend the world over^{1,2,14,15}, but differ from some recent reports which tend to give *Klebsiella* predominance^{16,17}. The fact that *Klebsiella* ranked third among the bacterial pathogens isolated in this study as against fourth and fifth^{1,4} will support the fact that it is an emerging force in urinary tract infections. It was equally present in both the pregnant and the non-pregnant patients. The findings of significant difference in the presence of staph aureus, proteus species and *Pseudomonas* in non-pregnant patients confirms the aetiopathogenesis of urinary tract infections in them, which will include nosocomial infection, and not because they are women^{18,19}. This finding also confirms the fact that most isolates in pregnant women were hitherto the normal commensals of the vagina¹. Isolation of *Candida albicans* and *Trichomonas vaginalis* in both pregnant and non-pregnant patients is alarming, though expectedly², more significantly present in pregnant patients. This calls for a closer attention at the relationship between vulvovaginal candidiasis and trichomoniasis with urinary symptomatology. The plausible reason might be that vulvovaginal candidiasis/trichomoniasis causes irritation. Subsequent scratching by patients bruises the urethra with subsequent painful micturition or even colonization by pathogenic bacteria. It may also simply be a result of contamination. The high incidence of *Candida* and *Trichomonas* contaminants is in conformity with previous studies^{10,12}, and calls for improved specimen collection method to reduce the rate. This may be difficult since swabbing of the vulva with normal saline 3 times as recommended may not eradicate these organisms. The increasing presence of gram-positive organisms - *Streptococcus faecalis* and *Staph aureus*¹⁶, should be born in mind when choosing antimicrobials for UTIs in women. The two microbes have poor susceptibility to the common, cheap antibiotics except cotrimoxazole and to a limited extent cloxacillin for staph aureus. The prominent gram-negative organisms found in non-pregnant patients - *Pseudomonas* and *proteus* species were resistant to all easily available antibiotics except *Gentamycin*. This should also be born in mind in the choice of antibiotics for UTIs in non-pregnant women, though it is usually advised that, *Gentamycin* should be used with *Ampicillin* to reduce development of resistant strains⁴. *Nalidixic acid*, *Nitrofurantoin*, *Ofloxacin*, *Ciprofloxacin*, *Cefuroxime* and *Ceftriaxone* are also drugs of choice^{21,22}.

Generally speaking organisms isolated from pregnant patients were more susceptible to antimicrobial agents, even though this was only statistically significant in the

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case of gentamycin. This however supports the likely theory that more drugs will be delivered to the urinary tract in pregnancy because of the increased renal blood flow in pregnancy. From the fore going, the drugs of choice for empirical therapy in cases of urinary tract infections in women will include *Gentamycin*, *Sulfamethoxazole*, *Nitrofurantoin*, *Nalidixic acid*, *Oxloxacillin*, *Cotrimoxazole*, *Cefuroxime* and *ceftriaxone*. *Gentamycin*, *Cotrimoxazole*, *Nitrofurantoin*, *Nalidixic acid*, *Oxloxacillin* and *Ciprofloxacin* are contraindicated in or at some periods of pregnancy.¹⁴ However, *Cotrimoxazole* and *Nitrofurantoin* have enjoyed widespread use in pregnant patients especially in mid-trimester.^{14,15,17} *Gentamycin* too may be of choice in pregnancy if the usefulness outweighs the risks, especially in cases of resistance to other drugs or when drugs are not available. It is noted that certain organisms such as *Haemolyticus*, *Viruses*, *Chlamydia* and *Campylobacter* have been identified as possible causes of UTIs, though they are not common. The commonly available culture media, which was used in this study, cannot identify these organisms and their relative importance cannot be evaluated in this study.

In conclusion there is evidence that *Escherichia coli* is still the commonest aetiological organisms of UTIs in women in this environment, but that *Klebsiella* is also becoming prominent. Also that the notorious gram-negative organisms like *Pseudomonas* and *Proteus* species are likely to cause UTIs more in non-pregnant patients. In terms of drugs, *Gentamycin* has been shown to be useful especially in pregnant patients while the other more expensive drugs are useful but the choice must be balanced between safety, cost effectiveness and availability. Another all encompassing prospective study that will compare invitro and in vivo effectiveness of the antimicrobials is desirable.

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REFERENCES

1. Catfell WR: Urinary tract infections in women. JR Coll Physicians. Lond 1997; 31 (2): 130-133.
2. Hurly R: Microbiology. In: Philippe, Barns J and Newton M (eds), scientific foundation of Obstetrics and Gynaecology. London: Heinemann Medical Books, 1990: 513-537.
3. Weissenbacher ER, Reisenderger K: Uncomplicated urinary tract infections in pregnant and non-pregnant women. Curr Opin Obstet Gynecol. 1993; 513-516.
4. Ali MB: Bacteriuria. Incidence, causative microorganisms and susceptibility pattern at Quatif Central Hospital, Ann Saudi Med 1991; 11: 429-434.
5. Ahmed TE, Ragaa MF: Urinary tract infection at University Hospital in Saudi Arabia: Incidence, Microbiology and antimicrobial susceptibility. Ann Saudi Med 1988; 8 (4): 961-966.
6. Patterson TF, Andriole VT: Detection, significance and therapy of bacteriuria in pregnancy. Infect Dis Clin North Am 1997; 11 (3): 593-608.
7. Rotimi VO, Emina HA, Eke PI: Transferable antibiotic resistance in E Coli isolated from UTI. Afr J Med Sci 1984; 13: 47-53.
8. Hooton TM, Stamm WE: Diagnosis and treatment of uncomplicated urinary tract infection. Infect Dis Clin North Am. 1997; 11 (3) 551-581.
9. Mitchell L: Epidemiology of drug resistance. Implications for a post-antimicrobial era. Science. 1992; 257: 1050-1055.
10. Onyemenem TN, Ekwegozor CC: Urinary tract infection in Ibadan: causative organisms and antimicrobial sensitivity patterns. Afr J Med Med Sci 1996; 25: 165-169.
11. Alausa KO, Montefiore D: Sensitivity of urinary pathogens from hospitalized patients in Ibadan to oxonilic acid and other chemotherapeutic agents. Ghana Med J 1979; 9: 107-111.
12. Alausa KO, Montefiore D, Sobayo E: Problems in the diagnosis of urinary tract infections. Nig Med J 1979; 9: 107-111.
13. Ascher AW, Sussman M, Weiser R: Bacterial growth in human urin. In: urinary tract infection. Grady TO and Brumfitt W (eds) Oxford Med Pub 1968, P.3.
14. Cheesbrough M: Medical laboratory manual for tropical countries. Vol 11: Microbiology. Cambridge, University Press, 1991; 146-155; 199-205.

15. Medean AB: Urinary tract infections in pregnancy. Br J Urol 1997, 80 suppl 1: 10-13.
16. Griumburg RN: Antibiotics sensitivities of urinary pathogens. Antimicrobial Chemother. 1984; 14: 17-23.
17. Bailey BB: Management of lower urinary tract infections. Drugs. 1993, 45 suppl 3: 139-144.
18. British National Formulary (BNF): Appendix 4: pregnancy; London: Pharmaceutical press. No 31 March 1996, 575-584.

"SAHELIAN WORDS
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*"The thing which is the most
outstanding and the most
desirable to all healthy and good
persons, is a Peaceful Life
With Honour!"*

- Marcus Tiellus Cicero