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**REPRODUCTIVE TRACT INFECTIONS AMONG WOMEN ATTENDING PRIMARY HEALTH CARE FACILITIES IN MOSHI, TANZANIA**

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**REPRODUCTIVE TRACT INFECTIONS AMONG WOMEN ATTENDING PRIMARY HEALTH CARE FACILITIES IN MOSHI, TANZANIA**

S. E. MSUYA, E. MBIZVO, B. STRAY-PEDERSEN, J. SUNDBY, N. E. SAM and A. HUSSAIN

**ABSTRACT**

**Objectives:** To determine the prevalence and risk factors for reproductive tract infections (RTIs), the frequency of asymptomatic genital tract infections, the frequency of genitourinary symptoms and signs and to assess their associations with vaginal and cervical infections.

**Design:** A cross sectional study carried out between September and December 1999.

**Setting:** Three primary health care centres in Moshi, Tanzania.

**Subjects:** A total of 382 consenting women attending Maternal Child Health (MCH) and Family planning clinics (FP).

**Interventions:** Women were interviewed and then pelvic examination was performed. Blood and genital specimens were collected for laboratory diagnosis of RTIs.

**Results:** Of the 382 women, 64% had at least one RTI (33.9% bacterial vaginosis, 27% *C. albicans*, 21.2% *T. vaginalis*, 5% *C. trachomatis*, 4% syphilis and 0.5% *N. gonorrhoea*) and 26% had at least one STI. Nearly 43% of laboratory diagnosed RTIs were asymptomatic. Although none of the women had reported abnormal urogenital symptoms during routine clinical consultation, 64% revealed such symptoms on direct questioning. Reported genital symptoms and signs were significantly associated with vaginal, but not cervical infection.

**Conclusions:** Curable RTIs are prevalent among women attending the MCH and FP clinics. Symptomatic infections were frequently not recognised or reported. We recommend introduction of routine RTI screening and treatment service in the MCH and FP clinics. Strategies to improve women's awareness and knowledge of urogenital symptoms should be instituted.

**INTRODUCTION**

Reproductive tract infections (RTI), including sexually transmitted infections (STI), represent a major public health problem in many developing countries(1). They are the second most frequent cause of disability adjusted life years lost among women of childbearing age(2). Untreated RTIs are potentially serious in both sexes but the impact of complications and sequelae are most severe in women and neonates. Some of these complications include pelvic inflammatory disease, infertility, chronic pelvic pain, cancer of the cervix, spontaneous abortion, stillbirth, eye and lung damage to new born babies(3-6). Bacterial vaginosis (BV), once regarded as a harmless non-transmissible genital infection, is associated with upper genital tract infection and implicated as a cause of premature rupture of membranes and pre-term delivery(5,7).

Apart from their complications, several studies support the role of classical STIs and other reproductive tract infections like BV, as risk factors in HIV infection(8-10). Their treatment has been shown to reduce the level of HIV shedding from the genital tract(11) and reduce community

transmission of HIV(12). Therefore, RTI control activities not only prevent complications but also offer an additional strategy for reducing HIV transmission.

Despite this, many primary health care facilities including maternal and child health (MCH) and family planning clinics (FP), fail to address RTIs in women. For many, the only alternative when genital tract infection is suspected is to refer the women to special STD clinics. These are few, overcrowded and stigmatising. However, efforts are underway to extend RTI services into primary health care facilities including MCH/FP clinics in the country. Availability of RTI services in MCH/FP clinics in Tanzania will provide a unique opportunity to improve women's health since as many as 97% of the women attend for antenatal care, 85% for immunisation of their children and 20% for family planning(13).

Before developing locally specific RTI management strategies, there is a need to establish knowledge of RTI prevalence including their associated risk factors, the relative contribution of different aetiological agents associated with specific syndromes, the diagnostic validity of symptoms and signs and antimicrobial sensitivity

patterns. This information is not yet available for women of reproductive age in Moshi.

The aim of this study was to establish the prevalence of asymptomatic and unrecognised reproductive tract infections among women attending reproductive health facilities in Moshi. STI risk factors, which would aid in developing appropriate clinical management algorithms, were also identified. In addition, the association between reported urogenital symptoms, clinically observed signs and laboratory identified vaginal and cervical infection was evaluated to see if syndrome based management is feasible in this population.

## MATERIALS AND METHODS

**Study population and sample collection:** After obtaining ethical clearance from the Tanzanian Ministry of Health and the Norwegian Ethical Committee, a cross sectional study was conducted between September and December 1999 at three primary health care clinics in Moshi urban district. The three clinics with the highest number of attendees (Majengo, Pasua, and Mawenzi) were selected as study sites. Women attending for antenatal care (ANC), family planning service (FP) and immunisation of their children (EPI) were randomly selected and invited to participate in the study. The purpose of the study and procedures were explained in brief to eligible women and informed written consent was obtained. The women were interviewed privately by a female nurse, in Swahili, using a standardised pre-tested questionnaire. Information on demographic factors, obstetric history, current contraceptive use, sexual behaviour and current symptoms involving the urogenital tract were obtained. Women were excluded if they reported taking antibiotics within the last 14 days, if they were menstruating or if they had undergone total hysterectomy.

A female physician then examined the women in a separate private room. A general and pelvic examination using a speculum was conducted. Ulcers, warts, cervical ectopy, abnormal vaginal and cervical discharge were noted. A sterile high vaginal swab was collected and placed in Stuart's transport medium for identification of *Trichomonas vaginalis* (TV) and *Candida albicans* (CA). Another vaginal swab from the side-walls was rolled on a glass slide and air-dried for Gram staining. Sterile endocervical swabs were collected for the detection of *Neisseria gonorrhoeae* (GC) and *Chlamydia trachomatis* (CT). The first endocervical swab was inspected and if it was yellow the "swab test" was considered positive. If the cervix bled after removing the first swab it was recorded as "easily induced endocervical bleeding". Bimanual palpation was done. Pelvic inflammatory disease (PID) was diagnosed clinically if both adnexal tenderness and cervical motion tenderness were present. Venous blood was collected for syphilis serology.

**Laboratory procedures:** Vaginal discharge remaining on the withdrawn speculum was used for pH determination and the "whiff test". All other specimens were processed in the clinical laboratory at K.C.M.C referral hospital.

Within five hours of sampling, the high vaginal swabs were inoculated on Sabouraud dextrose agar plates (SDA) and incubated at 37°C for isolation of *C. albicans*. Candidiasis was diagnosed based on a positive culture on the SDA and identified using the germ tube test. Then a wet preparation of the swab was made using normal saline for microscopic identification of *T. vaginalis*. The vaginal smear was Gram stained to detect the presence of "clue cells". Bacterial vaginosis was diagnosed

based on Amsel's criteria, the presence of at least 3 of the following: increased thin homogeneous vaginal discharge, positive "whiff" test, clue cells on a Gram stained vaginal smear and pH > 4.5. Vaginal infection was defined as the presence of TV, BV, CA or any combination.

*Neisseria gonorrhoeae* was isolated by inoculation of the endocervical swab on modified Thayer-Martin medium followed by incubation at 37°C in 10% carbon dioxide. Greyish colonies suggesting GC were tested using oxidase paper, and positive colonies were confirmed for their morphology by Gram stain for gram-negative intracellular diplococci and sugar fermentation test. Chlamydia antigen was detected in cervical swabs using an enzyme immunoassay, (Testpack® Chlamydia kit, Abbott Laboratories). Cervical infection was defined as the presence of either GC or CT infection or both.

Blood was centrifuged and the serum used for detection of syphilis. Syphilis antibodies were detected using qualitative immunoassay, (Determine Syphilis TP, Abbott Laboratories). Syphilis was diagnosed when the test result was positive.

**Treatment:** After examination, women with clinically apparent infections were treated according to national syndromic guidelines. Treatment was given free of charge. The women were asked to return after 7 days for test results. Infections subsequently detected by laboratory test were treated at the follow up visit. Those identified positive for STIs by laboratory results were asked to bring their partners for management.

**Statistical analysis:** The data were analysed using SPSS 8.0 statistical software. Statistical comparison between the various groups was made using  $\chi^2$  test and Fisher's exact test when appropriate and odds ratio and their 95% confidence intervals were used to measure the strength of associations. All p-values presented were two tailed. The level of significance were set at  $p \leq 0.05$ .

## RESULTS

Of the 392 women interviewed, ten left before the clinical examination and were excluded from analysis. Three women agreed to undergo serological examination but refused gynaecological examination. One woman had cancer of the cervix and therefore only serology was done. Serological analysis was done on 382 women and both full gynaecological examination and serology was done on 378 women. Due to financial constraints only 200 *Chlamydia trachomatis* tests were performed.

Of 382 women, 93% were married, 88% had 7 years of primary education and 63% were engaged in agriculture as their means of generating income. The mean age was 26.6 (range 16-46) and mean parity was 2 (range 0-8). Although 79% of the women had used different types of modern contraceptives, the majority (72%) reported that their partners had never used a condom during sex, and only 3.4% used them regularly. Twenty two percent reported having been treated for Reproductive Tract Infections (RTI) in the past 12 months.

Reproductive Tract Infections (Bacterial vaginosis, *C. albicans*, *C. trachomatis*, *N. gonorrhoeae*, *T. vaginalis* and *T. pallidum*) were equally prevalent among pregnant and non-pregnant women (Table 1). Bacterial vaginosis was the most prevalent RTI (33.9%), while *T. vaginalis* was the most common Sexually Transmitted Infection

**Table 1**

Prevalence of reproductive tract infections (RTI) and proportion that were asymptomatic among 382 women attending reproductive health facilities in Moshi, Tanzania, 1999

Infection	Pregnant (ANC) Cases/N (%)	Non-pregnant (FP/EPI) Cases/N (%)	Total Cases/N (%)	Asymptomatic‡ N (%)
<i>C. trachomatis</i>	4/80 (5.0)	6/120 (5.0)	10/200 (5.0)	6 (60.0)
<i>N. gonorrhoea</i>	1/175 (0.6)	1/203 (0.5)	2/378 (0.5)	—
<i>T. vaginalis</i>	41/175 (23.4)	39/203 (19.2)	80/378 (21.2)	36 (45.0)
Bacterial vaginosis	55/175 (31.4)	73/203 (36.0)	128/378 (33.9)	53 (41.4)
<i>C. albicans</i>	62/175 (35.4)	40/203 (19.7)	102/378 (27.0)	39 (38.2)
Syphilis	6/179 (3.4)	10/206 (4.9)	16/382 (4.2)	11 (68.8)
STI*	49/175 (28.0)	52/203 (25.6)	101/382 (26.4)	50 (49.5)
RTI**	119/175 (68.0)	125/203 (61.6)	244/382 (63.9)	104 (42.6)

‡No symptom of either abnormal vaginal discharge, genital itch, dysuria or dyspareunia

\**N. gonorrhoeae*, *C. trachomatis*, *T. vaginalis* and *T. pallidum*

\*\**N. gonorrhoeae*, *C. trachomatis*, *T. vaginalis*, *T. pallidum*, bacterial vaginosis and *C. albicans*

**Table 2**

Prediction of vaginal and cervical infections by elicited urogenital symptoms and clinical signs among 378 women in Moshi, Tanzania

	Vaginal infection (TV,BV,CA)			Cervical infection(CT)*		
	Positive	Negative	OR (95%CI)	Positive	Negative	OR (95%CI)
Total-laboratory proven	205	143		10	190	
<i>Elicited symptoms at interview</i>						
Abnormal vaginal discharge	67	22	2.2 (1.3-3.7)‡	4	47	2.1 (0.6 - 7.5)
Genital itch	85	19	3.7 (2.1-6.4)‡	2	58	0.6 (0.1-2.8)
Dysuria	46	19	1.6 (0.9-2.8)	1	39	0.4 (0.1-3.5)
Dyspareunia	49	30	1.0 (0.6-1.6)	1	37	0.5 (0.1-3.7)
Lower abdominal pain	123	58	1.6 (1.1-2.5)†	5	87	1.2 (0.3-4.1)
<i>Signs observed during pelvic examination</i>						
Abnormal vaginal discharge	186	19	24.8 (13.9-44.1)‡	5	98	1.0 (0.3-3.4)
Swab test positive	14	1	9.0 (1.2-69.2)‡	1	8	2.2 (0.3-19.6)
Induced endocervical bleeding	56	17	2.3 (1.3-4.2)‡	5	35	4.4 (1.2-16.1)†
Cervical ectopy	57	17	2.4 (1.3-4.3)‡	2	38	1.0 (0.2-4.9)
Cervical motion tenderness	59	15	2.9 (1.6-5.3)‡	3	34	2.0 (0.5-8.0)

\**C. trachomatis* was done on 200 women only.

‡P < 0.005

†P < 0.05

(STI) (21.2%) followed by *C. trachomatis* (5%). Recovery of *N. gonorrhoea* was notably uncommon. Two hundred and forty four women (64%) had at least one RTI and 85 (22.5%) had multiple infections. Almost 27% of the women had at least one STI (*C. trachomatis*, *N. gonorrhoea*, *T. vaginalis* and *T. pallidum*).

Both women with gonococcal infection had vaginal discharge, but 60% of women with chlamydia infection reported no symptoms (vaginal discharge, genital itch, dysuria or dyspareunia). Forty two percent of the women with vaginal infections were asymptomatic. Nearly half of the women with laboratory proven RTIs/STIs were asymptomatic (Table 1).

Of those with symptoms, no woman volunteered any

information about urogenital symptoms during normal clinical service consultation. On direct questioning however, 244 (64%) reported having at least one of the following symptoms: lower abdominal pain, 181 (47%), genital itching, 104 (27%), abnormal vaginal discharge, 89 (24%), dyspareunia, 79 (21%) and dysuria 65 (17%), Table 2. Upon examination, abnormal vaginal discharge (frothy, greyish or curd-like) was observed in 205 women (54%), 103 (50.1%) of whom reported symptoms of abnormal vaginal discharge and/or genital itch. Eight (2.1%) had vulvovaginal warts. Only one woman had a positive syphilis test among 17 with observed ulcers. PID was diagnosed in 23 percent (47/203) of the non-pregnant women.

**Table 3**

*Predictors of STIs (C. trachomatis, N. gonorrhoea, T. vaginalis, T. pallidum) by sociodemographic and behavioural factors among 382 women in Moshi, Tanzania.*

Risk factor	Cases/Total	Prevalence	OR	95%CI	p value
<i>Age</i>					
16-20	17/52	32.7	1.42	0.76-2.67	0.27
21-49	84/330	25.5	1		
<i>Marital status</i>					
Not married	7/26	26.9	1.03	0.42-2.52	0.95
Married	94/356	26.4	1		
<i>Changed partner in the past 3 months</i>					
Yes	5/8	62.5	4.83	1.13-20.6	0.03
No	96/374	25.7	1		
<i>Partners in the past 12 months</i>					
>1	15/38	39.5	1.96	1.00-3.92	0.05
0-1	86/344	25.0	1		
<i>Partners in the past 5 years</i>					
>1	31/90	34.4	1.67	1.00-2.78	0.04
0-1	70/292	24.0			

The association between elicited urogenital symptoms and clinical signs with cervical and vaginal infections was further studied (Table 2). Because there were only two cases of gonococcal infection, chlamydia infection alone was used to indicate cervical infection. Abnormal vaginal discharge ( $p=0.004$ ) and genital itching ( $p<0.001$ ) were significantly associated with vaginal infection while the association between elicited symptoms and cervical infection were weak and not statistically significant. Clinically observed signs were also significantly associated with vaginal infection, but only the sign of easily induced endocervical bleeding ( $p=0.03$ ) was associated with cervical infection.

Change of partner in the three months prior to interview (OR=4.83) or having more than one partner in the past 12 months (OR=1.96) were associated with having an STI, (Table 3). Women who were less than 21 years had ~40% more risk of having an STI than those who were older. Education, occupation, age of sexual debut, contraceptive use and partners age, education and occupation were analysed but were not associated with having an STI.

The relationship between various RTIs and PID was investigated. PID was significantly associated with the presence of bacterial vaginosis (OR=2.3, 95% CI 1.24-4), while other RTIs were not (chlamydia OR 0.6; 95% CI 0.1-5.8, trichomoniasis OR 1.2; 95% CI 0.5-2.7, candidiasis OR 0.7; 95% CI 0.3-1.6 and syphilis OR 0.4; 95% CI 0.1-2.9). PID was also associated with a history of infertility (OR=4.3, 95% CI 2.3 – 10.2).

## DISCUSSION

The women included in this study are inferred to represent the general population of women of child bearing age in the area as 99% of the women in Moshi urban district attend reproductive health clinics for routine care(14). The results show a high prevalence of undetected curable RTIs among women in this district. More than half

of the women studied had at least one RTI and more than a quarter had one classic STI. Women attending different clinics i.e. prenatal, family planning or immunisation of the children, participated in the study, showing that RTIs are prevalent in both pregnant and non-pregnant women. RTIs are thus a major public health problem among women of reproductive age in Moshi.

With the current situation at the clinics nearly all the infections would have remained undetected, even syphilis in pregnant women, as there are no routine RTI services offered whether syndrome based or by microbial diagnosis. Only one centre, Majengo, could offer antenatal syphilis screening. The high prevalence of untreated infection in these women is potentially serious. There is a serious risk of long term complications and death(3,4,7). Optimal pregnancy outcome and neonatal health are in jeopardy(3,5,6), transmission of STI in the community continues unabated, and the risk of acquiring and transmitting HIV is high(8-12). With extremely high clinic attendance(14), the facilities therefore miss the best potential opportunity to target women for proper RTI diagnosis, treatment and prevention.

Chlamydial infection was far more prevalent than gonococcal and was within the range of three to thirteen per cent found among women of reproductive age in other African countries(15-17). Only two women had proven gonococcal infection, which is surprising in the light of the high frequency of other RTIs. One explanation for the apparent low prevalence might be the relatively low sensitivity of GC culture when compared to DNA amplification techniques(15). Alternatively, the low prevalence could reflect a true picture. Considering that men with gonococcal infection are likely to be symptomatic, and therefore seek care early(16) may reduce the transmission risk per sexual act and the reservoir of infection in the wider community.

Asymptomatic genital infections were common in this population. This has also been documented among

women attending family planning clinics(17) and among women in the general population(18). This is disturbing because diagnosis depends on the availability of microbiological services, which are scarce in these settings.

However, detecting symptomatic infections may prove difficult, as women did not volunteer information about abnormal urogenital symptoms on normal clinical consultation unless questioned directly. This may suggest that they did not recognise their symptoms as being abnormal or felt reluctant to report such symptoms in MCH/FP clinics. This has serious implications as most of RTI/STI control programmes in resource poor settings recommend the use of the syndromic approach for management. This relies on symptom recognition by the infected person who as a consequence seeks medical care. Therefore, there is a need to understand how women perceive what are normal or abnormal genital tract symptoms and use this to form strategies to promote health-seeking behaviour.

The elicited symptoms of vaginal discharge and genital itch and several clinical signs significantly predicted vaginal infection but not cervical infection, results that are consistent with those in other settings(19,20). This implies that, in this population the symptom-based approach should focus on managing vaginal infection while the need to develop cheap, simple and reliable tests for chlamydia and gonococcal infections should also be a high priority. At the same time, health care workers should proactively enquire about urogenital symptoms so as to offer timely treatment for vaginal infections, which were the most prevalent RTIs in this setting. This will lead to symptom relief, prevention of obstetric(5,6) and gynaecological(7) complications and reduce the risk of HIV transmission associated with bacterial vaginosis and *T. vaginalis*(8,10).

Change of partner in the last three months showed a strong association with the presence of an STI. Other studies substantiate this finding(20). This may be used as one of the risk assessment factors when constructing clinical algorithms or may be helpful in selecting women for further clinical examination or diagnostic testing in settings where this is possible.

In this study PID was significantly associated with infertility. Infertility is one of the complications of PID, and available evidence indicates that many infertility cases in sub-Saharan Africa are attributable to chronic PID(3,4). A possible explanation is that due to lack of effective diagnostic and treatment services longstanding untreated lower genital tract infection leads eventually to complications such as chronic pelvic pain, infertility and PID. These complications may be present even when the initial infection is no longer present. In this study 23% and 12.6% of women were classified as having PID and infertility respectively. The need for adequate and easily accessible RTI services can not therefore be overemphasised.

The prevalence of condom use was low in this setting 28% had partners who had used them at least once but only 3.4% had used them consistently, as shown in other

studies among women of reproductive age (18,19). This is disturbing given the high prevalence of STIs. Alternative barrier methods that are female controlled like female condoms or vaginal microbicides should be explored.

In conclusion, a high prevalence of curable RTIs was observed among women in Moshi. Recognition and self-reporting of urogenital symptoms were poor. We recommend introduction of routine RTI screening and treatment of women attending reproductive health facilities for routine care. Strategies to increase awareness of urogenital symptoms should be instituted and health care workers should proactively enquire about symptoms among all women who come to reproductive health facilities. At the same time other approaches for RTI control are required, such as aggressive treatment of these infections in men, effective partner management strategies and novel approaches that also target asymptomatic infections.

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