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# Prevalence and transmission of *Trichomonas vaginalis* infection among women in Khartoum State, Sudan

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This study was carried out from January 2008 to December 2009 to determine the prevalence of trichomoniasis among women in Khartoum State, Sudan. Two different hospitals were selected. The two hospitals were Ibrahim Malik hospital which is serving an urban area and Ombada hospital which is serving a rural area and migrant people coming from other parts of Sudan particularly Western Sudan. Monthly data was collected including demographic, social and other factors related to infection with trichomoniasis using a questionnaire. Urine samples were collected weekly every month and examined using wet mount preparation method. 297 women were found infected with *Trichomonas vaginalis* of a total of 2473 examined making an overall prevalence rate of 12%. Prevalence of infection was slightly higher among women in Ombada hospital than those in Ibrahim Malik hospital but the difference is not statistically significant. However, difference in infection is statistically significant regarding areas of residence ( $P < 0.05$ ). The highest (15.6%) and the lowest (4.8%) prevalence rates were recorded in Alsalam locality (Ombada hospital) and Khartoum locality (Ibrahim Malik hospital) respectively suggesting a difference in awareness between rural and urban areas. Significant differences related to age were recorded. The highest prevalence rates were among women in the age groups 15 to 19 and 20 to 24 years. High infection rates were recorded during the hot and rainy season from July to October. Social, traditional and behavioral factors proved to be important factors in relation to infection of *T. vaginalis* among women in Khartoum State. Results indicate the importance of the problem and the need for more research and efforts to control it.

**Key words:** *Trichomonas vaginalis*, prevalence, traditions, social, behavioral factors.

## INTRODUCTION

*Trichomonas vaginalis* infection is one of the major health problems in the world, and one of the most common transmitted infections in many regions including the developed countries such as United State (Parbara, 2005). Prevalence estimates vary between populations studied falling in the range from 0.4 to 27.4% in women and 0.0 to 5.6% in men (Swygard et al., 2004). The annual worldwide incidence of trichomoniasis is more than 250 million cases (Seema and Arti, 2008).

In Sudan, trichomoniasis was reported among women by Omer (1978) and more recently by Salih (2005). But the actual burden of the disease in Sudan remains

unknown and no information on risk factors for *T. vaginalis* infection in women is available. Thus, the present study was undertaken among women in two hospitals in Khartoum State to give more information on prevalence and seasonal changes in transmission of the disease and to identify its associated risk factors. Findings of this study will lead to a better understanding of the disease and activate efforts for its control. Results will also stimulate further research in this area.

## MATERIALS AND METHODS

### Study area

This study was carried out among women patients of two hospitals in two localities in Khartoum State, Ombadda and Khartoum locality.

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Ombada locality lies at the western area of Omdurman town at about 7 km away from Khartoum. Ombada consists of three administrative units namely Albogaa, Alameer and Alsalam. Ombada is considered a migratory area as most of its population came from all parts of Sudan especially from Western Sudan with different culture and traditions. In this locality, there is a high degree of unawareness about the disease itself and health hazards as a whole. Khartoum locality lies between Blue and White Niles. Khartoum consists of seven administration units namely Alshohada, EL-geraif and Soba East, Alshagara, Middle, West and Khartoum unit. In this locality, there is generally better education and awareness about health hazards.

### Collection of urine samples

*T. vaginalis* was detected in women who are admitted to Ombada and Ibrahim Malik Hospitals with pelvic inflammatory disease (PID) or vaginal discharge complaints. Urine samples were obtained in a sterile container. All samples were examined by wet mount preparations method as described by Ackers and Lumesdn (1978).

### Wet mount preparations

A vaginal discharge samples were taken for diagnosis using wet smear as follows: Each subject was given a wide opening, leak-proof universal specimen container and was instructed on how to collect urine samples. About 20 ml of urine sample was obtained from each subject. No personal identifications (names, ID number, address etc) were used on the urine samples. Instead bar-coded numbers were used to ensure obscurity of subjects, to facilitate laboratory procedures and minimize the chances of errors during the handling of urine samples. Urine samples were placed into a tube and centrifuged (Ackers and Lumesdn, 1978). A drop of deposit was put on a slide, covered with a slip and examined under high power magnification 40x of light microscope and examined for motile flagellates. All positive cases were treated with metrinidazole (flagyl).

### Study of transmission pattern

Samples from Ombada and Ibrahim Malik Hospitals were examined for presence or absence of *T. vaginalis*. The sampling conducted weekly from indoor patients at Ombada and Ibrahim Malik Teaching Hospitals for successive twelve month period. The Medical Ethical committee of the hospitals approved the study and consent was provided for all participants. Clinical examination was conducted by a physician in each hospital for all patients including reason for presentation to the clinic, complaints, pregnancy, previous abortions and examination of the cervix and vagina. Our inclusion criteria for the study were: women aged 15 to 45 years who were sexually active and had referred to gynecology units or general clinics for either to be symptomatic (vaginal discharge, genital ulcer and low abdominal pain) or asymptomatic (routine examination).

A questionnaire was also used to collect data on socio-demographic status including age and area of residence; behavioral variables including marital status of women, type of water used in shower, types of plant fume or any herbs used as traditional medicine and partner infection; lack of information about sexually transmitted diseases and pelvic inflammatory diseases (STD and PID, respectively).

### Statistical analysis

Prevalence of infection was compared between different variables

by Chi-squared test. Significance was attributed to probability values  $P \leq 0.05$ . Computer SPSS and Microsoft excel programs were used for determination of probability values.

## RESULTS

Of the total population of 2473 examined in the two hospitals, 297 (12%) were found infected with *T. vaginalis*. Prevalence of infection was higher in Ombada hospital (12.4%) compared to Ibrahim Malik hospital (11.7%) but the difference was not statistically significant ( $P > 0.05$ ). However, difference due to area of residence was statistically significant as it is presented between localities in Table 1. Prevalence rates ranged between 11.9 and 15.6% in Ombada localities and between 4.8 and 12.8% in Ibrahim Malik localities (Table 1).

Prevalence of trichomoniasis infection in relation to age is shown in Table 2. The highest prevalence rates were 15.4 and 14.2%, and they were recorded in the age groups of 15 to 19 and 20 to 24 years, respectively. Prevalence rates tend to decrease in elderly women but the difference was not significant ( $P > 0.05$ ).

Prevalence of trichomoniasis among married, single and divorced women is presented in Table 3. The highest infection rate was among married women (13.3%). Difference in relation to marital status is statistically significant. Similar difference was also in relation to pregnancy status but the highest prevalence was among aborted women (Table 3).

The relationship of infection to type of tap water temperature used in houses is illustrated in Table 4. Significant difference in the prevalence of infection with respect to degree of water temperature was observed ( $P < 0.05$ ). The lowest prevalence rate was among women using hot water (10.8%); whereas, the highest rate was among those using cold water.

The relation between plant fume and trichomoniasis infection shows high effect from different types of plants (stems and branches of trees) which are traditionally used by women in all parts of Sudan. Women that used hot water had lower infection rates with increased water temperature compared to women that do not.

Patients infected with trichomoniasis showed various symptoms and signs of vaginitis. The frequency of vaginitis symptoms and signs is shown in Table 5. Vaginal discharge was the most common symptom in women (15.1%); the other high frequent symptoms or signs were priritus (12.3%) and abdominal pain 37 (12.5%). Vaginal discharge was significantly associated with *T. vaginalis*.

Figure 1 shows the monthly distribution of prevalence of *T. vaginalis* infection among women in Ombada and Ibrahim Malik hospitals. The highest number of infections was observed in October 17.8% while the lowest number of prevalence infections showed in February, March, April and May. Statistical analysis by Chi-square showed significant difference in the prevalence of infection by month.

**Table 1.** Prevalence of *T. vaginalis* among women in Ombada Hospital and Ibrahim Malik Hospital in Khartoum State.

Places	No. of infected	Total number	Prevalence (%)
Ombada Hospital*	145	1172	12.4
Ibrahim Malik Hospital*	152	1301	11.7
Alsalam	67	429	15.6
Alameer	46	387	11.9
Albogaa	24	201	11.9
Alshohada	40	421	9.5
Geraif+East soba	75	584	12.8
Alshagara	28	298	9.4
Middle Khartoum	16	132	12.1
Khartoum	1	21	4.8
Total	297	2473	12

\* P value &gt; 0.05; P value &lt; 0.05.

**Table 2.** Prevalence of *T. vaginalis* according to the age of women in Ombada Hospital and Ibrahim Malik Hospital in Khartoum State.

Age range	No. of infected	Total number	Prevalence (%)
15-19	55	357	15.4
20-24	92	650	14.2
25-29	57	518	11
30-34	43	357	12
35-39	34	405	8.4
40-45	16	186	8.6
Total	297	2473	12

P value &gt; 0.05.

**Table 3.** Prevalence of *T. vaginalis* according to marital and pregnancy status among infected women in Ombada Hospital and Ibrahim Malik Hospital in Khartoum State.

Women status	No. of infected	Total number	Prevalence (%)
Married	237	1783	13.3
Single	48	477	10.1
Divorced	12	213	5.6
Pregnant	71	703	10.1
Not pregnant	217	1637	13.3
Aborted	9	133	6.8

P value &lt; 0.05.

## DISCUSSION

The overall prevalence of the disease recorded among women in this study was 12% exceeding figures reported previously by Omer (1978) and Salih (2005). This refers to the importance of the disease among women. Moreover, it is clear from the findings of this study that the prevalence of infection was much higher in rural areas

compared to urban areas. This is logical since awareness about the disease and its associated risks and also access to health care centers in rural areas is by far less than urban areas.

The prevalence of infection was high among women of age groups 15 to 19 and 20 to 24 years compared to elder women (40 to 45 years). Similar pattern of infection in relation to age was reported in Sudan (Salih, 2005) and

**Table 4.** Prevalence of *T. vaginalis* in relation to type of plant fume and type of water temperature used by infected women in Ombada Hospital and Khartoum Hospital in Khartoum State.

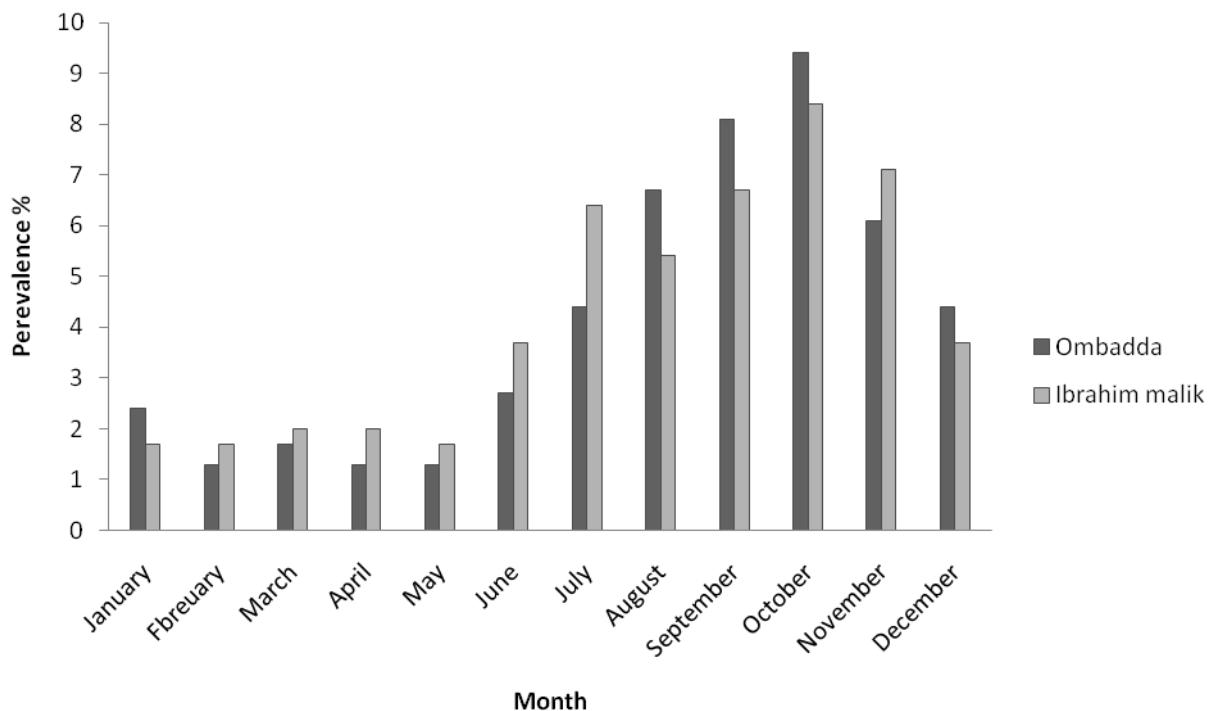
Type of plant fume	No. of infected	Total number	Prevalence (%)
Talih	152	1399	10.9
Shaf	47	464	10.1
Habeel	4	16	25
Fume not used	94	594	15.8
Cold water	60	480	12.5
Normal water	210	1743	12.1
Hot water	27	250	10.8

P value < 0.05

**Table 5.** Frequency of Trichomoniasis symptoms and signs among infected women in Ombada Hospital and Ibrahim Malik Hospital in Khartoum State.

Symptoms	No. of infected	Total number	Prevalence (%)
Vaginal discharge	144	957	15.1
Pruritus	42	340	12.3
Abdominal pain	37	297	12.5
Dysuria	23	256	9.1
Burning	19	222	8.6
Erythema	15	156	9.6
Pelvic pain	12	156	7.7
Dyspareunia	5	79	6.3
Total	297	2473	12

P value < 0.05



**Figure 1.** Monthly changes of prevalence of *T. vaginalis* infection among women in Ombada Hospital and Ibrahim Malik Hospital in Khartoum State.

in Nigeria (Chigozie et al., 2006; Adeoye and Akande, 2007). This is also in agreement with our observations in this study as the highest infections were among married women and all or most women in the age of 15 to 24 years are married. The low infection rates among women in the age of 40 to 45 years may probably be related to the development of acquired immunity to infection with increase of age.

As for infection of trichomoniasis in relation to pregnancy status, prevalence rates were less among aborted and pregnant women than among not pregnant women. This gives more evidence for the importance of regular clinical investigations for early diagnosis and treatment of such urino-genital infections in women as pregnant women are regularly visiting health units for routine check-up of pregnancy. However, in other studies in Nigeria for example pregnancy status did not affect the prevalence of trichomoniasis (Adeoye and Akande, 2007).

Prevalence of trichomoniasis tends to decrease with the increase of water temperature of path shower used by women in this study. The lowest records were among women using hot water. These observations agree with *in vivo* results described in Korea by Jae-Sook and Duk-Young (2006).

Traditional use of plants fume (Talih and Shaf trees) had lead to a lower infection rate of trichomoniasis among women using it. As these plants are usually heated on fire when used, high temperature may be the reason leading to high mortality of flagellates causing infection. Other reasons related to chemical composition of these plants should also be considered and studied in future.

Vaginal discharge was found to be high among infected women (15.1%) and seemed to be the prominent symptom of trichomoniasis infection in women. Other symptoms such as pruritis, abdominal pain and erythema were also reported among infected women in this study. Several studies have associated *T. vaginalis* with these symptoms particularly vaginal discharge and erythema and vulva irritation (Al-hindi and Lubbad, 2006 and Adeoye and Akande, 2007).

Significant seasonal changes have also been recorded in this study with a noticeable increase in prevalence of infection during the hot rainy season from July to October. This may be attributed to the less hygienic environment during this season in Sudan or to other reasons need to be investigated. However, Alhindi and Lubbad (2006) found no clear trend in prevalence of *T. vaginalis* infection in a study among Palestinian women over a period of 6 years.

## Conclusion

In conclusion, this study contributed in giving further information on prevalence of infection with *T. vaginalis*

among women in two different localities in Sudan. The study also identified some important factors related to disease infection and transmission and referred to the need for further research in this problem.

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