

Full Length Research Paper

Incidence of vulvovaginal candidiasis among Nigeria women in tight fitting underwears: The need for counseling and health education

U. P. Akpan¹, C. E. Ekpenyong^{1*}, J. E. Ibu² and J. O. Ibu³¹Department of Physiology, College of Health Science, University of Uyo, Uyo. Akwa Ibom State, Nigeria.²National Youth Service Secretariat Calabar, Cross River State, Nigeria.³Department of Physiology. Faculty of Basic Medical Sciences, Benue State University, Benue State, Nigeria.

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This cross sectional study aimed at investigating the effect of tight fitting underwears on the incidence of vulvovaginal candidiasis among non-pregnant women between aged 16 to 35 years. The study took place in seven health institutions between January and July 2009 in Uyo Metropolis, Nigeria. About 191(76.4%) of the 250 participants who were selected by sequential randomization met the inclusion criteria. Structured questionnaire were used to assess their regular patterns of dressing for the past one year and associated gynaecologic problems. Vaginal smear/swabs were taken from each participant for microscopy and culture. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) Version 13, using chi square (χ^2) test to compare the differences between the effects of various parameters about the incidence of vulvovaginal candidiasis. Values of $P < 0.01$ were considered statistically significant. A high incidence of vulvovaginal candidiasis (76.8%) with its associated symptoms were observed among women who regularly wore nylon tight and other synthetic pants than those who regularly wore cotton tight/cotton underwear/pants(42.9%). It can be concluded that women who predominantly wear nylon tight and other synthetic underwear/pants are at a higher risk of vulvovaginal candidiasis.

Key words: Gynaecologic problems, nylon tight pants, synthetic pants, Nigeria, vulvovaginal candidiasis.

INTRODUCTION

Vulvovaginal candidiasis is the infection of vulva and vagina with *Candida albicans*. This infection is characterized by intense vulval and vaginal irritation (itching) which often gives rise to inflammation, soreness, redness and white spots in and around the genital tract. Thick, cheesy white, curd-like vaginal discharge generally adherent as white patches to the vaginal wall, cervix and labia minora is observed. Also, painful urination and painful intercourse are associated with the infection. The infection could be acute, recurrent or chronic. It is interesting to note that, most, if not all, women carry *Candida* in the vagina as normal flora at some points in their lives, yet without symptoms or signs of vaginitis and usually with a low concentration of yeast organism

(Heidrich et al., 1984). Changes from these non-pathogenic to pathogenic strains require also changes in the host vaginal environment as the ones that could be created by wearing nylon and other synthetic tight underwears (<http://www.everydayhealth.com/yeast-infection/clothing.aspx>).

Ward et al. (1973) observed that vulvovaginal candidiasis was three times more common in women who regularly wear nylon underwear or tight than those on cotton underwear and tight. These types of materials is being noted to trap bacteria and increase temperature in the genital areas thereby creating a warm, moist environment, a pre-requisite for the development and proliferation of the pathogenic strains of *C. albicans* (http://www.patient.co.uk/health/vaginal_thrush.htm). In the study of panty hose pants disease, such environment was used as a predictive index for the development of fungal infection of the genital areas of the susceptible wearers (Turner, 1991). Also, unlike cotton, nylon is not

*Corresponding author. E-mail: chrisvon200@yahoo.com. Tel: 08023347719.

Table 1. Incidence of vulvovaginal candidiasis among non-pregnant women aged between 16 to 35 years in the study.

Group	Incidence rate (%)	χ^2	P- value
Overall (n=191)	61.8 (118)		
NTSP (n=121)	76.8 (93)	32.27 ^{SS}	<0.001
CTCP (n=70)	42.9 (30)		

NTSP (nylon tight/synthetic pants), CTCP (cotton tight/cotton pant), SS= Significant differences in incidence of vulvovaginal candidiasis between NTSP and CTCP were significant at P<0.01.

an absorbent material. As a result, perspiration is more likely to remain in contact with the genital area, thereby encouraging bacterial and fungal growth with associated odor. Tight fitting underwear could also prevent normal evaporation of vaginal discharge at the introitus, causing a constant moistness of the vulval and perineal region with redness and soreness.

Recently, there has been a trend of fashion among young women in Nigeria: they wear tight trousers, jeans, leggings, nylon and other synthetic underwear and the popular cycling short called "tight". The history of "tight"/tight trousers in Nigeria can be traced to the sit-aside order enacted by the Federal Government of Nigeria in 1989 on all passengers of commercial motor cyclist; and women in a bid for privacy resorted to the use of "tight" as underwear or tight fitting trousers. Therefore, this study was set to investigate the effect of nylon tight and other synthetic pants on the incidence of vulvovaginal candidiasis among Akwa Ibom State women.

MATERIALS AND METHODS

Study design was a cross sectional and took place in seven health institutions in Uyo metropolis, Nigeria, between January and July, 2009. The study protocol was approved by ethical and medical committee of these health institutions. Non-pregnant women aged between 16 to 35 years were chosen by sequential randomization. From the 250 participants selected, 59 (23.6%) were excluded from the study for conditions that could influence the result such as current antibiotic or contraceptive therapy and diabetes mellitus. A structured questionnaire was used to obtain information regarding their dressing patterns and the types of material used for the underwear. Adequate history of presenting complaints and past gynaecological histories were taken, and duly informed consent obtained.

Then, specimens from the vagina/vulva were taken, as well as swabs from the cervix and fornical pool (using sterile swab stick) for immediate microscopy and culture. The colour, odour, vulvovaginal sores and excoriations were noted. Specimens were conveyed in Marccarthy bottles containing transport media to be taken to the laboratory. The culture was done in sabouraud dextrose agar and incubated at 37°C for 3 days. After obtaining a pure culture of the organism, tests for identification were done. Colonies of the *Candida* species were characterized by high convex, off – white colonies of about 1.5 mm in diameter. Gram-staining of the isolates was done and *C. albican* was identified as it stained violet (Gram positive) while *Gonococcus* stained red (Gram Negative); Germ tube test was carried out and the development of pseudo-hyphae further demonstrated the presence of *C. albicans*. This test is mostly the presumptive identification of *C. albicans* which formed

90% of all human yeast isolates. This is sufficient as *Candida stellatoidea*, which could also be isolated from the vaginal swab specimen, is very rare and shares that ability (germ tube test positivity) but lacks the ability to assimilate sucrose. Though research has shown that other *Candida* species such as *Candida utilis*, *Candida rugosa*, *Candida schizosaccharomyces* and *Candida fragilis* do exhibit this phenomenon, they are not likely to be isolated in human (Kamaya, 1987).

Data was grouped and analyzed using Statistical Package for Social Sciences (SPSS) Version 13. The incidences of acute and chronic vulvovaginal candidiasis were calculated in the two groups (NTSP/CTCP) as simple percentages. Differences in the effects of NTSP and CTCP on the incidence and associated signs and symptoms (discharge, itching and soreness) among users were assessed by chi square (χ^2) test. P values of less than 0.01 were considered statistically significant.

RESULTS

The overall incidence rate of vulvovaginal candidiasis in the two groups (NTSP and CTCP) was 61.8% (118 of 191). Incidence rate for those who wore NTSP and CTCP were 76.80 and 42.86% respectively as presented in Table 1. The incidence of acute abnormal vaginal discharge was 82.64% (100 of 191) and 25.7% (18 of 191) for women on nylon tight/other synthetic pants (NTSP) and on cotton tight/cotton pants (CTCP), respectively. For recurrent abnormal vaginal discharge, it was 25.7% (18 of 191) and 1.43% (1 of 191) for women on NTSP and CTCP, respectively. Green-yellow and yellow discharge were observed in 10.74% (13 of 121) and 7.43% (9 of 121) for NTSP respectively, and 7.14% (5 of 70) and 28.57% (20 of 70) for women who wore CTCP at P<0.05. Incidence of acute and recurrent vaginal itching were 66.12% (80 of 121) and 6.61% (8 of 121) respectively for those on NTSP, and for those on CTCP these incidence were 21.43% (15 of 70) and 2.86% (2 of 70), respectively at P<0.01. Vaginal soreness was present in 19% (32 of 121) of women on NTSP as against 2.86% (2 of 70) of women on CTCP at P<0.01. All these data is summarized in Table 2. Table 3 shows the incidence of microorganisms obtained from women on NTSP and CTCP. *C. albican* was isolated from 76.86% (93 of 121) of women on NTSP against 42.86% (30 of 70) of women on CTCP. *Trichomonas vaginalis* was isolated from 23.14% (28 of 121) of women on NTSP and 17.14% (12 of 70) CTCP. *Neisseria gonorrhoea* was isolated from 4.96% (6 of 121) of women on NTSP and 2.86% (2 of 70) CTCP. Table 4

Table 2. Clinical signs and symptoms presented by non – pregnant women aged between 16 to 35 years in the study.

	Excessive vaginal discharge		Colour/consistency of vaginal discharge			Vaginal itching		Vaginal soreness
	Acute ^{SS} (%)	Recurrent ^{SS} (%)	White pasty ^{SS} (%)	Green yellow ^{NS} (%)	Yellow ^S (%)	Acute ^{NS} (%)	Recurrent ^{SS} (%)	(%)
NTSP (n = 121)	100(82.64)	18 (25.7)	99 (81.82)	13(10.74)	9(7.43)	80 (66.12)	8 (6.61)	32 (19)
CTCP (n = 70)	18(25.7)	1 (1.43)	40 (57.15)	5 (7.14)	20(28.57)	15 (21.43)	2 (2.86)	2 (2.86)

NTSP (nylon tight/synthetic pant), CTCP (cotton tight/cotton pants). SS= significant at 1% (P<0.01), S= significant at 5% (P<0.05), NS= not significant (P>0.05).

Table 3. Microorganisms cultured from isolates of non-pregnant women aged between 16 to 35 years in the study.

	<i>C. albicans</i> ^{SS} (%)	<i>T. vaginalis</i> ^S (%)	<i>N. gonorrhoea</i> ^{NS} (%)
NTSP (n = 121)	93 (76.86)	28 (23.14)	6 (4.96)
CTCP (n = 70)	30 (42.86)	12 (17.14)	2 (2.86)

NTSP (nylon tight/synthetic pant), CTCP (cotton tight/cotton pants). SS= significant at 1% (P<0.01), S= significant at 5% (P<0.05), NS= not significant at 5% (P>0.05).

Table 4. Incidence of other associated pelvic infection and/or inflammation in non – pregnant women aged between 16 to 35 years in the study.

	Vulvitis ^{SS}	Vaginitis ^{SS}	Cervicitis ^{SS}
NTSP (n =121)	43 (35.5)	39 (32.23)	49(40.50)
CTCP (n = 70)	7 (10)	10 (17.14)	9 (12.16)

NTSP (nylon tight/synthetic pant), CTCP (cotton tight/cotton pants).SS= significant at 1% (P<0.01).

shows vulvitis was present in 35.5% (43 of 121) of women on NTSP and 10% (7 of 70) on CTCP at P<0.01, while vaginitis was present in 32.23% (39 of 121) of women on NTSP and 17.14% (10 of 70) CTCP at P<0.01. Also 40.50% (49 of 70) of women on NTSP had cervicitis while it was present in 12.86% (9 of 70) of women on CTCP.

DISCUSSION

Despite therapeutic advances, vulvovaginal candidiasis remains a common problem worldwide,

affecting all strata of society (Jack, 2007) Studies indicate that vulvovaginal candidiasis is responsible for 15 to 30% of vulvovaginal symptoms, and that *Candida* species affects 70 to 75% of women at least once during their life time, most frequently young women at child bearing age (Hurley and Delouvous, 1979; Heidrich et al., 1984; Foxman et al., 1998; Jack, 2007). Furthermore, 40 to 50% of women will experience a recurrence (Hurley and Delouvous, 1979; Foxman et al., 1998). Our results are in accordance with these studies, demonstrating a high incidence of vulvovaginal candidiasis especially among women wearing

nylon tight/synthetic pants.

Besides, 82% of women who regularly wore nylon tight/other synthetic pants presented virtually all signs and symptoms of vulvovaginal candidiasis and swab cultures from 93 (76.86%) of them yielded *C. albicans*, against only 42.86% of the ones who wore CTCP. In a study of panty hose – pant disease, it was reported that vulvovaginal candidiasis was less common in 1940s and 1950s when loose under wears similar to boxer-shorts were commonly worn, and women who wore panty hose had about three times more yeast vaginalis infection than non-wearers (Turner,

1991). This upsurge in incidence of vulvovaginal candidiasis has posed a very serious threat to the fertility status of our young women as persistence or recurrence of it could lead to serious pelvic inflammatory diseases with associated complications such as ectopic pregnancy, menstrual irregularities, tubo-ovarian abnormalities and subsequent infertility. This is because vulvovaginal candidiasis could occur concomitantly with other sexually transmitted diseases (Ward and Sutherst, 1973). In this study, *T. vaginalis* and *N. gonorrhoea* were also isolated in the cultures along with *C. albicans* in 23.14% (27.9) and 4.98% (6), respectively of women who predominantly wore NTSP.

Epidemiological evidence shows that *C. albican* is a common gynecologic infection in other part of the world. In USA, it is second only to bacterial vaginitis in prevalence. It is estimated that three out of four women will be affected by this infection at least once in their lives, with approximately half of these women experiencing more than one episode. In Lagos the prevalence rate of *C. albicans* in all female genital swabs was 8. (Enweani et al., 2001) as at 1978, while between 1980 and 1990, it nearly doubled. Results from the present study shows that swab cultures from 76.86% (93) of Akwa Ibom State women on NTSP yielded *C. albicans* as against only 42.86% (30) of women on CTCP.

This high incidence of vulvovaginal candidiasis among our women is not without economic consequences. For example, in 2002, women in USA spent over half a billion dollars on medication to treat vulvovaginal candidiasis with about half of this amount spent over the counter prescription (Consumer Health Care Product, 2003). However such records, if available in Nigeria, would be alarming, especially with increase in number of our young women using nylon/other synthetic tight under wears.

These observations, therefore, provide the scientific basis for health educators and guidance counselors to advice women to wear loose/ cotton under wears and avoid the nylon tight /other synthetic materials. Such health education could be given in workshops, during ward rounds in hospitals, radio and television campaigns.

Conclusion

From the present study, it is observed that the incidence of vulvovaginal candidiasis among Akwa Ibom State women wearing tight fitting under wears is very high and that women who predominantly wear nylon tight/other synthetic pants are at a higher risk of vulvovaginal candidiasis than those who do not wear such underwears.

REFERENCES

- Jan S (2003). Dressing to prevent yeast infection. Everyday health. Online: <http://www.everydayhealth.com/yeast-infection/clothing.aspx>, Consumer Health Care Product, Available at: www.chpa.info.org.
- Eckert L, Hawes S, Stevens C, Koutsky L, Eschenbach D (1998). Vulvovaginal candidiasis: Clinical manifestation, risk factors, management algorithm, *Obstet. Gynecol.*, 92: 757-765.
- Enweani IB, Gugnani OR, Ojo SB (2001). Effect of contraceptive on the prevalence of vaginal colonization of *Candida* species in Edo State, Nigeria. *Rev. Iberoam. Micol.*, 18(4): 17-30.
- Foxman B, Marsh J, Gillesp B, Sobal J (1998). Frequency and responses to vaginal symptoms among white and African American women: results of random digit dialing survey. *J. Women. Health*, 7: 111 – 174.
- Heidrich F, Berg A, German R (1984). Clothing factors and vaginitis. *J. Fam. Pract.*, 19: 491-498.
- Heidrich F, Berg A, German R (1984). Vaginal yeast colonization in non pregnant women: a longitudinal study. *Obstet. Gynecol.*, 104: 926-930.
- Hurley R, Delouvous J (1979). *Candida vaginalis* British Post graduate. *Med. J.*, 58: 148-150.
- Jack D (2007). *Vulvovaginal candidiasis*: *Lancet*, 369: 1961-1971
- Kamaya T (1967). Simple rapid identification of *Candida albicans* with emphasis on the differentiation between *Candida albicans* and *Candida stellatoidea*. *J. Biomed. Life Sci.*, 35(2): 105-112.
- Patient.co.uk: Vaginal thrush, a comprehensive health information as provided by general practitioners and nurses to patient during consultation. Online: http://www.patient.co.uk/health/vaginal_thrush.htm.
- Turner M (1991). Panty hose – pants disease. *Am. J. Obstet. Gynecol.*, 164: 1366 - 1369.
- Ward G, Sutherst J (1973). Pruritus Vulva. *BMJ.*, 860: 243 - 246.