A STUDY OF VAGINAL DISCHARGE IN PREGNANCY

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Introduction

Vaginal discharge is one of the most common complaints encountered in our obstetric and gynaecological practice. Trichomonas and monilial infections of the vagina are responsible for the majority of these cases. Prior to the first quarter of this century vulvovaginitis due to these organisms was not regarded as common and only isolated reports appeared in the literature. Infection due to trichomonas has been recognised more and more and gained importance both in gynaecological and obstetrical practice during the next decade. But the importance of monilial vaginitis was recognised only by 1940.

Candida albicans was first described by Robin in 1847. Since then many workers rediscovered and identified these organisms under different generic names, such as Oidium, Syringospora, Monilia, etc. (Skinner 1947). But it was known as a pathogen as early as 1840, when Wilkinson reported the presence of yeast-like organisms in the vaginal discharge. However, the gynaecologists of the early years of this century either doubted that the vaginitis had any connection with the fungi or they believed that mycotic vaginitis was very rare. Few attempts were made to study the vaginal mycosis prior to 1924 when Castellani and Taylor described vaginal monilia and moniliasis (Carter 1940). It is due to the monumental work of Hasselttine (1933, 1938, 1940) and his associates that a new appreciation of Candida as an important cause of vaginitis again became current.

That pregnant women are more predisposed to vaginal moniliasis has been a common observation. The raised glycogen content of the vaginal epithelium rather than the greater acidity of the vagina has been held mainly responsible for the increased susceptibility.

Prior to 1959 only a few reports appeared in the Indian literature. Desai *et al* (1959) studied 46 cases of vulvo-vaginitis; Pohowalla and Kaul (1959) Dey (1959) Menon (1959), Sathyavathi (1959) Dafthary (1959) and others made special studies of vulvo-vaginal moniliasis.

Trichomonas vaginalis is never found free in nature; and it is a parasite strictly confined to man. Accord-

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ing to Trussel and others (1940), the first vaginal infection due to trichomonas vaginalis was reported by Donne in 1836. Trussel succeeded in producing the disease experimentally by injecting bacteria-free trichomonas vaginalis into the vagina of voluntary subjects. Glycogen in the vaginal epithelium seems to be necessary for the development of the parasite (Liston W. G. 1940).

It was the purpose of this investigation to study the incidence of candida and trichomonas in the vagina of pregnant women and to correlate the findings with the common symptoms of vulvo-vaginitis. Many reports appeared in the gynaecological and obstetrical literature during the past few years from other parts of the country. This is the first study of its kind from Kerala.

Material and Methods

Vaginal discharges from 500 pregnant women of the antenatal wards of the Sri Avittam Thirunal Hospital were collected and subjected to the study. All these patients were in their last trimester of pregnancy. Blood-stained discharges were discarded.

Patients were prepared as if for a vaginal examination and were put in the lithotomy position. After inspecting the external genitalia the posterior vaginal wall was retracted with a Sim's speculum. The appearance of the vaginal walls, cervix and the nature and quantity of the discharge were noted and the material was collected from the posterior fornix.

The pH of the discharge was estimated by using the narrow range indicator paper (B.D.H.). Small quantities of each specimen were mounted in normal saline and 10 per cent potassium hydroxide and examined under the microscope. Saline preparation helps in the identification of trichomonas vaginalis by its characteristic flagellar movements. Fungal elements are seen more clearly in potassium hydroxide preparation, since the fatty and cellular material dissolve in the alkali but the fungi remain intact.

Culture. Swabs were streaked over four per cent glucose agar plates to which was incorporated 20 units of penicillin and 40 micrograms of streptomycin per millilitre of the media. The inoculated plates were incubated at 37°C. Small creamy white colonies started their appearance within 48 hours. Strains were purified by the sub-culture of a single colony fished out from the streaked plates. Purified isolates were identified by their cultural morphology exhibited in various culture media. The procedure of Conant and others (1954) was followed. The surface growth and bubble production in glucose peptone broth was studied. The morphology of the colonies formed in blood agar plates were also studied. Sugar fermentation tests were done with glucose, maltose, sucrose, and lactose and the ability of acid and gas production of each strain was studied. Sugar utilisation tests were also carried out, using glucose, maltose, sucrose, lactose, galactose and raffinose. Sugar-free basal media were melted and inoculated with species of candida after cooling at 45°C. It was poured into sterile petrie dishes

and allowed to spread uniformly. Sterile penicillinders were placed in the medium at equal distance and sterilised sugars were added in each cylinder. The petrie dishes were incubated at 37°C. for 3 to 5 days and the sugar utilisation studied.

Finally chlamydospore production was studied by the cut streak inoculation of the organism in Corn-meal agar plates.

Identification of trichomonas by culture was not attempted, and the identification was solely dependent on the examination of the wet saline preparation.

All the expectant mothers were questioned according to a prepared schedule, and data like age, parity, occupation, symptoms etc. were recorded as accurately as possible. A general examination was carried out to detect any associated general ill-health and the presence of fungal infection of the skin.

Results

Age. The youngest patient was 15 years old and oldest 45. Table I shows the age-wise incidence of candida and trichomonas. No age group appeared to be more prone to any of these infections.

Social Status. Most of these patients belonged to the lower middle class or poor class. No direct relationship could be postulated with reference to the occupation and the incidence of candida and trichomonas. Parity varied from one

TABLE I

Age group	Number examined	Candida positive		T.V. positive	
		Number	Per cent	Number	Per cent
15-20	56	24	42.9	11	19.5
21-25	129	51	39.5	22	17.0
26-30	163	51	31.3	37	22.7
31-35	89	29	32.5	22	24.7
36-40	50	17	34.0	12	24.0
40 and above	13	2	15.4	2	15.4

TABLE II

Gravida	Cases examined		Positive for Candida		Positive for T.V.	
	Number	Per cent	Number	Per cent	Number	Per cent
One	60	12.0	21	35.0	10	16.7
Two	70	14.0	36	51.4	18	25.7
Three	63	12.6	22	34.9	14	22.2
Four	74	14.8	19	25.6	14	18.9
Five	64	12.8	14	21.8	9	12.0
Six	53	10.6	27	50.9	12	22.6
Seven	48	9.6	12	25.0	13	27.0
Eight	35	7.0	11	31.4	10	28.7
Nine	18	3.6	7	38.8	4	22.0
Ten	9	1.8	4	44.4	2	22.0
Above ten	7	1.4	1	14.2	—	—

to twelve. Table II shows the number and incidence of candida and trichomonas as per gravida.

Of the 500 cases studied, 275 (55 per cent) complained of one or more of the symptoms like increased vaginal discharge, pruritis, or soreness. They were grouped as symptomatic. The other 225 (45 per cent) did not have any of these symptoms and were classified as asymptomatic. While the incidence of monilial infection was only 33.4 per cent in the symptomatic group it was 36.4 per cent in the asymptomatic group (Table III). But the incidence of trichomonas infection was quite striking, being 27.3 per cent in the symptomatic and 12 per cent in the asymptomatic. Combined infection was noticed in 8.7 per cent and 4.4 per cent respectively in in the symytomatic and asymptomatic groups.

Table IV shows the species of candida isolated in the two groups. Candida albicans was found to be the

TABLE III

	Symptomatic group		Asymptomatic group	
	Number	Per cent	Number	Per cent
Number examined	275	100.00	225	100.00
Number positive for Candida ..	92	33.40	82	36.40
Number positive for T.V. ..	75	27.30	27	12.00
Number positive for T.V. and Candida	24	8.70	10	4.40

TABLE IV

Species of Candida	Symptomatic group		Asymptomatic group		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
C. albicans	45	48.9	43	52.4	88	50.5
C. tropicalis	17	18.4	16	19.5	33	18.0
C. parapsilosis	11	11.9	8	9.7	19	10.0
C. stellatoidea	8	8.6	5	6.0	13	7.4
C. krusei	7	7.6	5	6.1	12	6.9
C. guillermondi	3	3.2	5	6.1	8	4.6
C. lypolitica	1	1.1	—	—	1	0.5

TABLE V

Range of pH	Candida positive	T. V. positive	Both positive	Both negative (normal group)
Upto 4	5	—	—	2
4.1 - 4.5	7	—	—	11
4.6 - 5.0	27	—	—	34
5.1 - 5.5	38	1	2	54
5.6 - 6.0	15	6	5	26
6.1 - 6.5	3	33	14	8
6.6 - 7.0	—	17	5	5
Mean pH	5.0	6.5	6.2	5.2

most common (50.5 per cent) followed by Candida tropicalis (18.0%) and Candida parapsilosis (10.08 per cent). Candida lypolitica was encountered only once in our study. Practically there is no difference in the species incidence in the two groups.

Table V and Graph I show the distribution of the cases in relation to the pH of the discharge. The pH varied from 4 to 7. Majority of the normal and Candida positive cases were under pH 6, whereas the majority of the T. veginalis positive cases were above pH 6. While the distribution curve is extra-ordinarily identical for both the normal and candida positive cases, the curve of the T. vaginalis positive cases is significantly more towards the alkaline side.

Table VI shows the incidence of the symptoms in the different groups. Increased vaginal discharge was the most common complaint in all the three groups. It was significantly high in the presence of trichomonas. While 67.6 per cent of the trichomonas positive and combined infection group complained of this symptom, only 45.7 per cent of candida positive and 43.1 per cent of the normal group complained of leucorrhoea. Pruritis was the next common symptom. The maximum incidence (32.3 per cent) was noticed in those with double infection. The candida positive and trichomonas positive groups showed almost the same incidence (26.9 per cent and 27.4 per cent respectively). Minimal incidence (18.6 per cent) was seen in those without any of these infections. Of all the symptoms soreness was the least common. Its distribution was more or less the same in the candida

TABLE VI

Symptom	Candida positive 212		T. V. positive 102		Both positive 34		Both negative 220	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Discharge (1)	97	45.7	69	67.6	23	67.6	95	43.1
Pruritis (2)	57	26.9	28	27.4	11	32.3	41	18.6
Soreness (3)	12	5.6	14	13.7	3	8.8	10	4.5
1 and 2	36	17.0	17	16.6	8	23.5	30	13.6
1 and 3	3	1.4	4	3.9	1	2.9	3	1.3
2 and 3	2	0.9	—	—	—	—	2	0.9
1. 2 and 3	3	1.4	8	7.8	2	5.8	7	3.1

TABLE VII

Quantity	Candida positive 212		T. V. positive 102		Both positive 34		Both negative 220	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Scanty	4	1.8	1	0.9	—	—	13	5.9
Average	120	56.6	34	33.3	16	47.0	127	57.7
Profuse	29	13.8	67	65.6	18	52.8	80	36.3

positive and those without any infection. Soreness was most common with trichomonas positive cases (13.7 per cent). Combinations of these symptoms were often encountered as shown in the Table.

Table VII shows the relationship of the amount of discharge to the type of infection. The discharge was scanty* in 5.9 per cent of the women without any infection, in 1.8 per cent of candida positive cases and in 0.9 per cent of T. vaginalis positive cases. Average amount of discharge was noticed in 57.7 per cent of the normal cases, 56.6 per cent of the candida positive cases, 33.3 per cent of T. vaginalis positive cases and 47 per cent of the combined infection group. The discharge was profuse in 65.6 per cent of T. vaginalis positive cases in 52.8 per cent of the combined infection group, in 13.8 per cent of the candida positive cases and in 36.3 per cent of the normal cases.

Table VIII shows the nature of the discharge in relation to the type of infection. White paste-like discharge was common in the normal group as well as in the candida positive group, the incidence being 72.5 per cent and 65 per cent respectively. The same type of discharge was noticed only in 22.4 per cent of the T. vaginalis positive cases and 35.3 per cent of the combined infection group. Purulent discharge was noticed in 66.6 per cent of the T. vaginalis positive cases and 55.9 per cent of the combined infection group but it was seen only in 22.6 per cent and 13.6 per cent of the candida positive group and normal group respectively. Mucoid discharge was found more often in the normal group than in the other groups. The discharge was just like frothy sputum with large bubbles in six cases, of which two were candida positive and three T. vaginalis positive and one showed none of these organisms. The discharge was hard, precipitate, sticking on to the walls of the vagina in 13 cases of which 11 revealed monilial infection.

Table IX shows the incidence of candida in women who had previous antibiotic therapy. There was no significant increase in the incidence of candida infection in these women. So also there was no correlation between the dermal fungal infection and

* The term scanty was applied when the amount of discharge was insufficient or scarcely enough to complete all the investigations.

TABLE VIII

Type of the discharge	Candida positive 212		T. V. positive 102		Both positive 34		Both negative 220	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
White pasty	138	65.0	23	22.4	12	35.3	160	72.5
Purulent	48	22.6	68	66.6	19	55.9	30	13.6
Mucoid	15	7.0	6	5.8	1	2.9	29	13.1
Frothy	2	0.9	3	2.9	—	—	1	0.4
Precipitate sticking on the wall.	9	4.2	2	1.9	2	6.0	—	—

TABLE IX

	Cases with antibiotic therapy	Cases without antibiotic therapy
Number examined	32	468
Candida positive	12	162
Percentage	37.5	34.6

the vaginal moniliasis as shown in table X.

TABLE X

	Cases with dermal fungal infection	Cases without dermal fungal infection
Number examined	77	423
Candida positive	29	145
Percentage	37.7	34.2

Cultural methods were more reliable in the diagnosis of candida infection than smear method. Only 62 cases showed positive results by culture and by microscopy. But 112 cases, found to be negative by microscopic examinations, gave positive cultures for candida species. Thirty-eight cases, diagnosed as candida positive, failed to grow in culture. It may not be easy to differentiate the non-pathogenic yeasts from the candida species by smear examination alone. Thus the cultural methods are superior to smear for the diagnosis of candida infection.

Discussion

The monilial and trichomonal vaginitis are held the two most important causes of vulvo-vaginitis during the child-bearing period of life. Candidal infection is more often encountered than trichomonas infection. In the present series moniliasis predominated and was found in 34.8 per cent of women whereas trichomonas was seen only in 20.4 per cent. Both these organisms may co-exist and 6.8 per cent of our cases revealed combined infection.

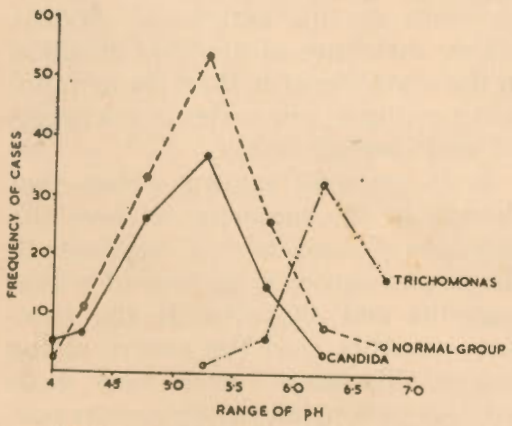
Menon (1959) has reported the incidence of monilial infection in pregnant women as 40 per cent. Daftary found an incidence of 47 per cent and 43 per cent in the symptomatic and asymptomatic groups respectively as against our 33.4 and 36.4 per cent. Daftary has also reported the incidence of trichomonas infection as 47 per cent and 14 per cent in the symptomatic and asymptomatic group respectively as against the 27.3 and 12 per cent of this series. A slightly higher incidence of monilial infection in the asymptomatic than the symptomatic group in our series is unexpected and unexplainable.

It is too well known a fact that though in the majority of cases the presence of candida or T. vaginalis in the vagina causes symptoms of vulvo-vaginitis and alteration in the reaction, quantity, and the nature of the vaginal discharge, often they exist without causing any symptoms or producing any variations in the vaginal discharge. Therefore it would be in-

teresting to compare those infected with candida or T. vaginalis with those not infected with any of these organisms from the point of view of the distribution of the symptoms and changes in the discharge.

The absence of any difference between the candida infected group and those without any infection from the above point of view is the most striking in this small series of cases investigated. It may be surprising to note that the incidence of candidal infection was slightly higher in the asymptomatic group than in the symptomatic group, 36.4 and 33.4 per cent respectively. Excepting a slightly higher incidence of pruritus vulvae in the candida positive cases the distribution of the symptoms of vulvo-vaginitis is practically the same as that of the normal group. The distribution of the pH of the discharge is identical for both these groups. Thus the presence of candida does not seem to alter the pH of the vaginal discharge. The nature as well as the amount of the discharge also remain almost identical for these two groups of women.

GRAPH No. I



FREQUENCY DISTRIBUTION OF pH IN CANDIDA & TRICHOMONAS POSITIVE GROUPS.

On the other hand, those infected with T. vaginalis showed a striking difference from the normal group. The incidence of T. vaginalis infection was significantly higher in the symptomatic group than in the asymptomatic group — 27.3 and 12.0 per cent respectively. The maximum incidence of the symptoms of vulvo-vaginitis was found in this group. The distribution of the pH shows a marked shift towards the alkaline side. The maximum incidence of profuse discharge as well as purulent discharge also was noticed in this group.

Summary

Vaginal discharge from 500 pregnant women was collected and the incidence of Trichomonas and Candida infection studied. Candida infection was more often encountered than trichomonas. Combined infection was detected in 6.8 per cent of cases. The candida isolated were typed into species.

An attempt was made to correlate the distribution of the symptoms of vulvo-vaginitis, changes in reaction (pH) the amount and the nature of the discharge to the type of the organism identified. Practically, there was no difference between the candida positive group and the normals. But T. vaginalis positive group showed a very striking difference from the normals.

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