CLINICAL & LABORATORY STUDIES ON CUTANEOUS CANDIDIASIS

By

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Candidiasis is a common infection of skin. Its manifestations are protean C. albicans is reported to exist in and on the human body as a saprophyte (Marten 1959, Plass et al 1931, Marwin 1949) and assume pathogenic role under conditions of lowered host resistance. Besides C. albicans, other species of candida have been reported to be pathogenic (Drouhet 1961, Awachat 1961). The problem of candida infections has assumed greater importance with the advent and widespread use of antibacterial antibiotics, a fact which prompted a study of clinical aspects of cutaneous candidiasis and its methods of laboratory diagnosis.

MATERIAL AND METHODS

The study consisted of 56 patients clinically suspected to be suffering from cutaneous candidiasis and 50 controls, consisting of patients suffering from non-mycotic skin diseases not involving the intertriginous areas, attending the out patient department of All India Institute of Medical Sciences, New Delhi.

In all patients relevant historical and clinical data were recorded.

These patients and controls were investigated as follows:—

I. (i) Scrapings from the cutaneous lesions of the patients and intertriginous areas of the controls for direct microscopic examination in 10% aqueous solution of KoH for fungal elements and culture.

(ii) Culture of throat swabs and faeces of 30 patients and 30 controls.

Primary cultures were done on Sabouraud's glucose agar with 0.05 g. per ml. Chloramphenicol. Pure growths were obtained by subculturing on Sabouraud's glucose broth and beef extract blood agar. Identification of species was done by using:

(1) Eosin methylene blue agar.
(2) Corn meal agar with Tween 20.
(3) Fermentation reactions.

II. 54 patients were investagated for diabetes as follows:

(i) Urine examination for sugar by using Benedict's qualitiative reagent.
(ii) Fasting blood sugar estimation.
(iii) Glucose Tolerance Test if fasting blood sugar was normal or showed a borderline rise.

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Received for publication on 6-1-1969.

Blood sugar estimations were done by Nelson-Somogyl method (Hawk et al 1953).

III. Serum anticandida agglutinins were estimated in 56 patients and 50 controls.

(i) The antigen was prepared as described by Kurup et al (1962) except that two strengths of antigen, 25 million and 75 million cells per ml. were prepared.

(ii) Specific Serum from rabbit was prepared as described by Saslaw and Campbell (1948) by using the higher strength of the antigen.

(iii) The agglutination reactions were carried out by using doubling dilutions of the sera and equal quantities of antigen (25 million per ml). The specific serum from the rabbit and normal saline to which equal quntities of antigen were added were used as positive and negative controls.

OBSERVATIONS AND RESULTS

Table I. Types of Lesions

	Types of Lesion	No.	Per centage	M.	F.	Ch.
I	Chronic Paronychia	27	48.2	2	25	—
II	Intertriginous Lesions	24	42.8	—	—	—
	a) Inguinal	17	—	15	2	—
	b) Inframammary	2	—	—	2	—
	c) Toe cleft	3	—	—	3	—
	d) Finger Webs	1	—	1	—	—
	e) Multiple Sites	1	—	—	1	—
III	Balanoposthitis	3	5.4	3	—	—
IV	Vulvovaginitis	2	3.6	—	—	2
		56		21	33	2

Chronic Paronychia—25 females were housewives. Fingers of right hand were involved in 51.9%, fingers of left hand in 14.8% and those of both hands in 33.3% of the patients.

Intertriginous lesions: 9 out of 17 patients with inguinal lesions and two patients with inframammary lesions were obese. The interdigital lesions were confined to 3rd and 4th spaces of feet and 3rd spaces of hands.

Balanoposthitis was observed in four patients, one of whom had inguinal lesions also. Three of these had partial phimosis. The vaginal discharges of the wives of two of the patients revealed C. albicans.

TABLE II.

Incidence of Diabetes

Type of lesion	No.	Diabetes	Percentage
Chronic paronychia	27	2	7.4
Intertriginous lesions	24	7	29.2
Balanoposthitis	3	2	66.6
	54	11	20.4

MYCOLOGICAL ASPECTS

Mycelia and spores were found in KOH preparations in 66.6% of chronic paronychial lesions and 100% of all other cases.

C. albicans was isolated from the lesions of all patients except in two cases of chronic paronychia in whom C. tropicalis was repeatedly isolated in culture.

Fungal elements could not be found in the scraping of the intertriginous sites of 50 controls in KOH preparations and none of the species of candida could be cultured from these scrapings.

TABLE III.

Throat and Stool Cultures

	Controls (30)		Patients (30)	
	No.	Species	No.	Species
Positive throat cultures	9 (30)%	C. albicans 8 C. tropicalis 1	14 (46.6%)	All C. albicans
Positive stool cultures	13 (43.3%)	C. albicans 12 C. tropicalis 1	24 (80%)	C. albicans 22 C. tropicalis 1 C. psuedotropicalis 1

MORPHOLOGICAL VARIATIONS

1) On Beef Extract Blood–103 out of 110 strains of C albicans developed typical smooth round colonies, the remaining 7 strains developed stellate calonies.
2) On Eosin Methylene Blue agar. 2 out of 110 strains of C. albicans did not develop feathery colonies.
3) On Corn meal agar with Tween 20–3 out of 110 strains of C. albicans did not develop chlamydospores.

SERUM ANTICANDIDA AGGLUTININS

Table IV Sera Positive and Negative for Agglutinins

	Total No. Examined.	Positive	Negative	Percentage Positivity
Controls	50	19	31	38.0
Patients	56	41	15	73.2

Table V Distribution of Agglutinin Titres

Titres	Below 10	10	20	40	80	160	Total
Controls	1	7	11	—	—	—	19
Patients	2	5	13	12	8	1	41

DISCUSSION

Chronic paronychia was the commonest type of cutaneous candidiasis in this study perhaps because of its chronicity. Most workers have made similar observation (Conant et al 1965, Das Gupta and Shome 1958, Gokhale and Padhye 1959) Females were more affected than the males (sex ratio 12.5 : 1) perhaps due to the fact that fingers of the females are exposed repeatedly to trauma and moisture during household work. The fingers of the right hand were more commonly affected than those of the left hand and this is due to fact that in most people the right hand is the working hand.

The next common type of cutaneous candidiasis was the intertriginous variety. The commonest localisation of these lesions were in the groins in 17 out of 24 patients. 15 out of these 17 patients were males. The male preponderance of inguinal lesions is due to the anatomical features and the type of dress worn by men which promote sweat retention, maceration, warmth and friction which provide the ideal soil for the growth of candida. Obesity is another predisponsing factor. Nine out of 17 patients with inguinal lesions and 2 females with inframammary lesions were obese.

Four patients had balanoposthitis. One of them had in addition, intertriginous lesions. Three of them had partial phimosis which could have resulted from candidal infection. Wives of two of these patients who were available for examination revealed C. albicans in their vaginal discharges, indicating the possibility of genito-genital transmission of the infection.

As only two cases of vulvovaginitis were observed in children no opinion is offered.

CUTANEOS CANDIDIASIS AND DIABETES

The incidence of diabetes among patients of cutaneous candidiasis was found to be 20.4%; the highest (66.1%) being in cases of balanoposthitis and the least in cases of chronic paronychia. Five of these patients were not aware of their diabetic status. Thus in these five patients the cutaneous lesions were pointers to the systemic disorder, viz diabetes.

MYCOLOGICAL ASPECTS

C. albicans was isolated in 54 out of 56 patients and in the remaining two (both of chronic paronychia) C. tropicalis was isolated repeatedly. The pathogenicity of C. albicans is well established (Whittle & Gresham 1959, Whittle & Burns 1960, Maibach & Kligman 1962). C. tropicalis has been reported to cause cutaneous lesions (Drouhet 1961, Awachat 1961). In view of these reports and the fact that C. tropicalis was repeatedly isolated from these two cases of chronic paronychia, it is likely that C. tropicalis was playing an etiological role in these two lesions.

C. albicans has been isolated from healthy human mouth (Fisher 1936, Anderson 1944, Marten 1959) and faeces (Schooner 1939, Marten 1959) where it exists as a

saprophyte. Most human infections are stated to arise from endogenous source (Conant et al 1955). In this study a significantly higher percentage of patients showed C. albicans in their throat and faeces which suggests the possibility of gastrointestinal tract being a source of cutaneous infection.

Many workers have isolated candida from normal skin (Greenbaum & Klauder 1922, Benham 1931 Montgomery 1943, Marwin 1949). In 50 control patients none of the species of candida could be isolated from any of the intertriginous sites. All these reports are from the western countries, and no report of any attempt to isolate candida from healthy skin in this country could be traced at least in the recent literature. Failure to fine candida on the healthy skin in this study may be due to difference in the habits and clothings of Westerners and Indians.

MORPHOLOGICAL VARIATIONS

C. albicans forms smooth round dull grey to white colonies on beef extract blood agar at 37C° (Marten et al 1937, Benham 1957). Out of 110 strains of C. albicans isolated in this study, 103 strains conformed to this description. The remaining 7 strains developed stellate colonies which are typical of C. Stellatoidea. The development of stellate colonies by C. albicans on beef extract blood agar was also reported by Das Gupta (1962).

Out of 110 strains of C albicans, two strains did not develop feathery colonies on E. M. B. agar. Three other strains did not develop chlamydospores on Cornmeal agar with Tween 20. Thus the diagostic values of E. M. B. agar and C M. A. with Tween 20 in identification of C. albicans in this study were 98% and 9?% respectively. But it was noted that the two strains which did not develop feathery colonies on E. M. B. agar developed chlamydospores on C. M. A. with Tween 20 and the three strains which did not develop chlamydospores on C. M. A. with Tween 20 developed feathery cononies on E. M. B. agar. So a ra, id identification of C. albicans could have been made in this study in 100% of the isolates by using both these media simultaneously without recourse to the time consuming fermentation reactions. However in view of the reported development of feathery colonies by occasional strains o C. Krusei and C. Parakrused (Walker & Huppert 1959) and of chlamydospores by C. Stellatoidea (Martin et al 1937) and occasional strains of C. tropicalis (Walker & Huppert 1959) It may be necessary to do fermentation tests in identification of C. albicans when there is discrepancy between the findings of E. M. B. agar and C. M. A. with Tween 20.

AGGLUTINATION REACTIONS

38% of control patients showed agglutinins in tneir sera. This figurse is in close agreement with that reported by Kurup et al (1962) who found agglutinins in 39.4% of 500 control sera. The maximum titre of agglutinins seen in the control sera was 1:20. Among the patients, 73.2% showed agglutinins in their sera; 20 had titres 1 20 and belcw; 21 had titres 1:40 and above. These figures indicate that agglutinins in

titres higher than 1:20 are found only in patients with clinical candidiasis and are significant particularly in conjunction with clinical and mycological findings. However in view of the fact that agglutinins could not be detected in 15 patients and 20 patients showed agglutinins in titres of 1:20 or less, reliance cannot be placed on agglutination reactions as a routine diagnostic aid in cutaneous candidiasis.

SUMMARY

56 cases of cutaneans candiasis consisting of chronic paronychia, Intertriginous lesisons, balanoposthitis, and vulvogaginitis were studied. The predisposing factors were discussed. The incidence of diabetes was found to be 20.4%.

C. albicans was isolated in 54 out of 56 patients and in the remaining two C. tropicalis was isolated and its etiological significance was discussed.

A higher precentage of patients were found to harbour C. albicans in their throat and faeces than the controls and therefore G. I. tract was suggested to be a source of infection.

None of the species of candida could be isolated from the intertriginous areas of control patients. The probable reason for this variance from many wastern reports was suggested to be differences in the habits and clothing of Indians

Morphological variations of C. albicans on Beef Extract Blood agar, E.M.B. agar, and C.M.A. with Tween 20 were pointed out. The place of fermentation reactions inidentification of C. albicans was discussed.

High titres of agglutinins were found only in patients with clinical candidiasis but agglutination reactions were found to be unreliable as a routine diagnostic aid in cutaneous candidiasis.

ACKNOWLEDGEMENT

We thank Dr. L. N. Mohapatra, M.D., Ph.D., Associate Professor of Microbiology, All India Institute of Medical Sciences, New Delhi for his help in carrying out this work. Our thanks are also due to the Dean, All India Institute of Medical Sciences, New Delhi, for permitting us to publish this article.

REFERENCES

1. Anderson, N. A., Sage, D. N. & Spudding, E.H., A.M.A.J. Dis. child 1944, 67, 450.
2. Awachat, A. K., Antiseptic, 1961, 58, 43.
3. Benham, R. W., J. In. Dis., 1931, 49, 183.
4. Benham, R. W., J. Chr. Dis., 1957, 5, 460.
5. Conant, N. F., Smith, D. T., Baker, R. D., Gallaway, J. L., & Martin, D. S., Manual of Clin. Mycol., Saunders, Philadelphia, 1955, 169.
6. Das Gupta, S. N., & Shome, S. K., Mycopath. et Mycol. Appl. 1958, 10, 177.
7. Drouhet, E., Year Book Derm. 1961–62, 343.
8. Das Gupta, L. R., Thesis. A. I. I. M. S , New Delhi, 1962.
9. Fisher, V , J. Am. Dental Ass., 1936, 23, 165.
10. Greenbhaum, S. S. & Klauder, J. V., A.M.A. Arch. Derm. & Syph. 1922, 5, 332.