



FEATURES OF SOME BIOLOGICAL PROPERTIES OF YEAST-LIKE FUNGI OF THE GENUS CANDIDA

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ABSTRACT

The aim was to study the cultural and proteolytic properties of yeast-like fungi of the genus Candida. It was found that the natural variability of the morphology of C. albicans colonies depends on the duration of storage of strains and the number of passages. In addition to typical S and atypical K forms, R forms can be detected in both collection and hospital strains. Negative results on proteolytic activity were established for collection strains in the third passage, for hospital strains in the first passage.

KEYWORDS: *Candida, Candida albicans, proteolytic properties, C. tropicalis, C. pseudotropicalis, C. krusei, C. guilliermondi, C. pelliculosa, C. parapsilosis.*

INTRODUCTION

Yeast-like fungi of the genus *Candida* are a separate genus in the classification of microorganisms, which has more than 80 species [Koch H., 1973], but only some species can cause various diseases in humans. These include *Candida albicans*, *C. tropicalis*, *C. pseudotropicalis*, *C. krusei*, *C. guilliermondi*, *C. pelliculosa*, *C. parapsilosis*. Fungi of the genus *Candida* belong to opportunistic plant fungi, they are often isolated from the surface of the skin and mucous membranes of humans [Iskhakova Kh. I. and co-authors, 1986; Bazhenov L. G. and co-authors, 2002, 2005]. In clinically healthy individuals, candidiasis reaches 5%, and in individuals with inflammatory processes of the mucous membranes 53.2% of cases [Rebrova R. N., 1979].

Cultivation and quantitative accounting of yeast-like fungi of the genus *Candida* is important in the diagnosis of *Candida* infections and determining the degree of dysbiosis of various biotopes of the organism. Changes in the habitat of fungi of the genus *Candida* leads to changes in their various

biological properties, including cultural, proteolytic properties, adhesiveness and a number of others. This will lead to a decrease in their detectability in qualitative and quantitative terms.

In this regard, the purpose of this study was to study the cultural and proteolytic properties of yeast-like fungi of the genus *Candida*, which are most susceptible to changes under the influence of various factors.

Materials and methods. We studied morphological, cultural, proteolytic properties of the main representative of yeast-like fungi of the genus *Candida-Candida albicans*. Identification and differentiation of isolated microorganisms was carried out according to Bergi [1997]. To compare the results, 3 passages of collection and hospital strains of *Candida albicans* were carried out.

All studies were carried out in the Urgench branch of the Tashkent medical Academy and research Institute of EMIZ of the Ministry of health of Uzbekistan using generally accepted bacteriological methods. Statistical processing of the material was carried out on a personal computer

using the program "Excel".

RESEARCH RESULT

Taking into account the growth properties of Candida albicans colonies grown on nutrient media was evaluated on a scale proposed by Nuraliev N. A. and co-authors [2004]:

Level I-good growth (typical colonies, juicy, full, lush. Abundant growth during incubation in 370C 1 шНур 7 8-24 hours, meets the nomenclature requirements, morphological, tinctorial, enzymatic and other biological properties of cultures of microorganisms do not change); 76

Level II-moderate growth (colonies are small, dryish, lag behind in development to typical forms for 4-6 hours with incubation in 370C 18-24 hours, while preserving the morphological, tinctorial,

enzymatic and other biological properties of cultures of microorganisms);

Level III-weak growth (colonies are very small, visually determined with difficulty and does not meet nomenclature standards when cultivated under conditions recommended by conventional techniques);

Level IV-no visible growth.

Growth properties of different collection strains of Candida albicans were studied on rice-bran aqueous extract (ROVE), which was prepared in two versions: I - on nutrient broth; II - on isotonic 0.5% NaCl solution. The results obtained show that the sown crops grow equally well on this medium at concentrations 104 and 102 after 48 hours of cultivation in the thermostat-370C (table 1).

Table 1
Growth properties of Museum cultures of yeast-like fungi of the genus Candida when cultivated in rice-bran aqueous extract (ROVE).

Culture, registration number	ROVE on nutritious broth				ROVE at 0.5 % NaCl			
	After 24 hours		After 48 hours		After 24 hours		After 48 hours	
	Density							
	10 ⁴	10 ²	10 ⁴	10 ²	10 ⁴	10 ²	10 ⁴	10 ²
Candida albicans 7 003838	II	IV	I	II	II	IV	I	I
Candida albicans 10 003848	II	IV	I	II	II	IV	I	I
Candida albicans 5 003818	I	II	I	I	I	II	I	I
Candida albicans 723 003592	I	II	I	I	I	II	I	I

Note: Growth properties by degrees I, II, III, IV by Nuraliev N. A. and co-authors (2004).

In addition, we studied the natural variability of morphology of grown colonies of collection and hospital strains of Candida albicans (table 2). It was established that during primary sowing (I - pass) the population of Candida albicans consists of the following types of colonies: a colony typical in morphology (S form); a colony atypical in morphology - a dwarf form (K form).

Typical colonies are smooth, convex, shiny with smooth edges, white; on the third day of growth at 370C on the Saburo medium with 4% glucose, the dimensions are 3-7 mm in diameter. in the atypical form, all signs are similar, only on the third day of growth the diameter of the colonies is up to 2 mm.

The ratio of these colonies has certain

quantitative expressions for different strains. This ratio of colonies in the population of the studied strains is natural and depends on the duration of storage and the number of passages. In addition, colonies of another morphological type (R form) may appear in the third passage. These colonies are radially folded, raised from the surface of the medium, white, with a diameter of up to 4 mm. The Frequency of occurrence is insignificant-0.4-0.8%.

Table 2
Natural variability of colony morphology in population
Candida albicans (in %).

Passage	Frequency of morphological forms of colonies					
	Collectible strains			Hospital strains		
	S	K	R	S	K	R
I	76±2,8	24±1	0	95,2±1,4	4,8±1,2	0
II	82±2,4	18±1,3	0	96,7±1,5	3,3±1,4	0
III	82±1,8	17,2±1,8	0,8±0,6	88,4±2	11,2±1,6	0,4±0,4

It should be emphasized that with increasing generation in the population of "dwarf" forms, the quantitative ratio of these forms decreases significantly and the number of S forms increases. This indicates that the "dwarf" forms of colonies are not stable and have a phenotypic character of

variability.

The next stage of the work was to determine the variability of proteolytic activity of the same collection and hospital strains of *Candida albicans* in a comparative aspect. All results are obtained after each passage (table 3 and 4).

Table 3
Variability of proteolytic activity of different forms of collectible strains of Candida albicans (in%)

Passage	Degree of proteolytic activity					
	High		Average		Low	
	S	K	S	K	S	K
I	10±3,2	19,3±3	18±4	42,2±6,3	72±5,2	38,5±4
II	0	6,5±2,8	30,4±4	39,4±5	69,6±5,3	54,1±3,8
III	0	0	0	50±8,3	96±8	50±8

It was found that in the first passage, the percentage of high proteolytic activity was higher in the K form compared to the S form of collection strains - 19.3±3% and 10±3.2%, respectively. In the second passage of the same cultures, this trend has

persisted. It is interesting to note that negative results on proteolytic activity were established in the third passage for S form of collection strains (4±3,3%), in K forms this peculiar change was not observed.

Table 4
Variability of proteolytic activity of various forms of hospital strains of Candida albicans (in%).

Passage	Degree of proteolytic activity					
	High		Average		Low	
	S	K	S	K	S	K
I	39,2±7,2	21,1±6	22,1±6	18±5,3	28,6±6,7	32±6,6
II	0	0	40±7,3	30±6,7	60±7,7	70±5,8
III	0	7,3±3,2	74,2±6	60,4±8,2	25,8±4,8	32,3±6,2

A different picture in further studies we observed in hospital strains. High proteolytic activity was observed in the S form by 1.86 times more than in the K form of colonies (39.2±7.2% vs. 21.1±6%). Negative results on proteolytic activity were revealed for hospital strains already in the first passage - for S form in 10.1±4.5% and for K form in 28.9±4.7% cases. But with the increase in the number of passages, the proteolytic activity of the S form gradually decreases and in the third passage, high activity is practically not detected.

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CONCLUSION

1. Evaluation of growth properties on the proposed scale indicates a good and moderate growth of yeast-like fungi of the genus *Candida* at a concentration of 104 and 102 degrees after 48 hours in rice-bran aqueous extract.

2. The natural variability of the morphology

of *Candida albicans* colonies depends on the duration of storage of strains and the number of passages. In addition to the typical S forms and atypical K forms in the third passage, R forms can be detected in both collection and hospital strains. Frequency of occurrence equal to 0.4-0.8 percent.

3. Negative results on proteolytic activity were established for collection strains in the third passage for the S form in $4\pm 3,2\%$ cases, for hospital strains in the first passage for the S form in $10.1\pm 4,5\%$ cases, for the K form in $28,9\pm 4,7\%$ cases.

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