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Psychology, Sociology and Pedagogy, Social Science  
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Art, Religion, History, Culturology, Philosophy  
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## Preface

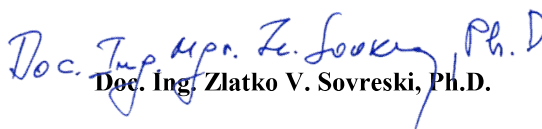
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These proceedings contain the papers of the GV Conference (Global Virtual) 2014, which was organised by the THOMSON Ltd. (Slovakia), The-Science.com portal, and Goce Delchev University (Macedonia), 7 – 11 April, 2014. This international Virtual Conference provided a very good opportunity for all the participants to share experiences, results and cooperation with international colleagues.

More than 140 researchers from 34 different countries submitted their papers to this conference. Each submission has been evaluated by the Scientific Committee (in average by 3 independent reviewers) and by Technical Committee with Editorial correction, to ensure that accepted submissions were of a high standard. Consequently only 117 papers were published. An extended version of the best papers will be invited to be published in sci-pub.com journals.

We are grateful to all authors who have submitted their papers to enrich the conference proceedings. We wish to thank all members of the Scientific Committee and Organizing Committee whose contribution and involvement are crucial for the success of the conference

In the name of the Organizing committee



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April, 2014

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# Location Features of Genus Candida Representatives In Oral Biotopes in Patients with Diabetes Mellitus Type 1

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**Abstract—** In this paper the Candida fungi in different biotopes of oral cavity in patients with the diabetes mellitus type 1 were investigated, the clean cultures of Candida fungi were selected, authentication is conducted and it's topographical features were founded; it is revealed that the most level of contamination by the yeast-like fungi is attributable for the dorsal surface of the tongue, cheeks and mouth corner (mucous and skin border). Candida fungi on the oral cavity mucous membrane in patients with diabetes mellitus I - type were found in 65% of subjects (58,5% of patients was suffering from candidiasis of the oral cavity and 6,5% of patients was belonging to candida-carriage. And Candida albicans was the most common representative among identified Candida's in all investigated oral biotopes (88,5%).

**Key words -** Candida fungi; oral cavity candidiasis; diabetes mellitus type 1; oral candida- carriage; biotopes of oral cavity; composite fillings.

## I. INTRODUCTION.

It is known that diabetes mellitus is one of the risk factors for oral candidiasis [3, 6, 12]. Fungi of the genus Candida are the resident microflora of the oral mucosa with high carrier level [2, 7]. Disorders of carbohydrate metabolism in diabetes mellitus are a favorable background for the development of candidiasis in oral cavity especially.

As important environmental factors for the development of fungi are the content of organic matters, moisture, temperature, pH of their home. Therefore, the oral mucosa is an ideal place for the development of the pathological process caused by fungal flora [7]. Thus, fungi of the genus Candida are saprophytes mucous membranes and skin with high carriage level that has a marked tendency to increase.

Manifestation of pathogenic fungi of the genus Candida properties depend mainly on the state of the macroorganism. Major role in the development of candidiasis a weakened immune system is playing. Candidiasis occurs usually in immune deficiency or imbalance of the immune system [4, 5].

The principal pathogenetic distinction of superficial candidiasis forms, which include candidiasis of the oral cavity, is the level of immunological protection against infection and,

consequently, the level of damage during infection. This level is determined, above all, the localization of the pathogen [2, 7].

At a superficial candidiasis Candida spp. is opposed by immunocompetent cells: macrophages and other antigen representative cells, peripheral T cells and humeral factors secreted [2, 7].

Diabetes mellitus adversely affects the function of macrophages and T leukocytes, which serve as the main body protective barrier against bacterial infections that develop in the mouth [10].

On the other hand, xerostomia, which is a consequence of hyperglycemia and polyuria during diabetes mellitus, also leads to a decrease in the protective functions of the oral mucosa [11, 13, 14, 19].

In addition, high levels of glucose in the blood and oral fluid is also a rich environment for the development of fungi of the Candida genus [15, 16, 17, 20].

So this situation is the basis for the study of Candida genus fungi in the various biotopes of the oral cavity in patients with diabetes mellitus first type.

The purpose of the study is to estimate the Candida fungi in the oral cavity of young adults (18 - 30 years) patients with type 1 diabetes mellitus, to species identification and to determine the topology of Candida on the mucous membrane of the mouth.

## II. MATERIALS AND METHODS.

To achieve this goal, we have examined the composition of different oral mucosa biotopes concerning its Candida fungi aspect in 48 young patients with a diagnosis of diabetes mellitus type 1.

The object of investigation was six biotopes of the mouth with the different epithelial characteristics concerning keratinization, glycogen level, aeration, surface relief and presence of the polymer surface (composite filling at the contact tooth surface).

The microbiological material was collected from mucous membrane of the cheeks (retromolar area), dorsal surface of the

tongue, mouth angle (mucosa and skin border), hard palate mucous membrane, the composite fillings from contact tooth surfaces, tooth - gingival sulcus.

Collecting material for microbiological studies was carried out with sterile cotton turundas on wooden sticks. The collected material immediately plated on nutrient medium (Sabouraud medium).

In the paper bacterioscopic, bacteriological, statistical research methods were used.

Identification of *Candida* yeasts was performed by using a test - ID of 32 test strips and BioMerieux Company HiCrome *Candida* Agar / Modified. The operating principle of the past is that *Candida albicans* colonies spontaneously stained in blue color as a result of hydrolysis of the chromogenic substrate hexosaminidase that allows for direct and rapid identification of *Candida albicans* after 24 hours cultivation with the sample. Yeast colonies that hydrolyze the second chromogenic substrate, painted in pink color that allows us to differentiate mixed cultures and conduct indicative identification of other species of *Candida* yeasts (*C. tropicalis*, *C. lusitanae* and *C. kefyr*), forming pink colonies (Fig. 1). The characteristic colonies can mean differential preliminary identification of filamentous fungi and *C. krusei* [8, 9, 18].

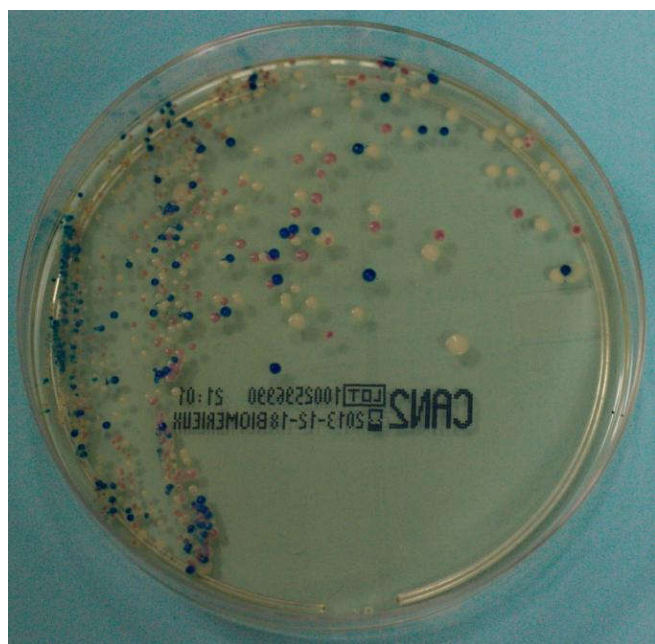


Figure 1. Identification of *Candida* yeasts fungi by using of HiCrome *Candida* Agar: blue colonies – *Candida albicans* (ATCC 10231); pink colonies - *Candida tropicalis*, *Candida kefyr*, *Candida lusitanae* (ATCC 9968); white colonies with characteristic aspect – orientation towards yeasts - *Candida crusei* (ATCC 6250) or filamentous fungi.

### III. RESULTS AND DISCUSSION.

By results of the conducting studies fungi of the genus *Candida* on the mucous membrane of the oral cavity in patients with diabetes mellitus I - type diagnose were found in 64,58 % (31 patients) of individuals. Moreover, 28 patients - 58,33 % of patients had candidiasis of the oral cavity - quantitative

composition of yeast fungi of the genus *Candida* was in the range of  $10^4 - 10^6$  CFU (colony forming units). Other 3 persons - 6,25 % of the patients belonged to candida-carriage - number of *Candida* was less than  $10^3$  CFU.

In representatives of the genus *Candida* in the oral cavity within biotopes *C. albicans*, *C. krusei*, *C. tropicalis*, *C. kefyr* were revealed. Thus 8,5 % is *C. albicans*, 3,8% - *C. krusei*, 3,8% - *C. tropicalis*, 3,9% - *C. kefyr*.

So the highest level of contamination of yeast fungi in patients with diabetes mellitus and candidiasis of the oral cavity was found on the surface of the mucous membrane of back of tongue – 69,2 %, slightly lower number of *Candida* yeasts was found in the cheek mucosa biotope – 61,5 %, and the corner of the mouth (mucosa and skin border) – 46,2 %, intensive colonization of yeast fungi was found on the surface of the mucous membrane of the hard palate – 38,5 %, the lowest amount of yeast is characteristic for the tooth - gingival grooves – 15,4 % and composite fillings of contact teeth surfaces – 11,05%. Quantitative composition candida's in different oral biotopes Figure 2 illustrates.

In patients with type 1 diabetes mellitus *Candida albicans* occurs as a part of each of the studied biotopes in the prevailing amount. *Candida crusei* a much smaller number (relative to the previous representative yeast) occurs in the biotope dorsal surface of the tongue. *Candida tropicalis* and *Candida kefyr* are detected in the smallest amount and are found only in the area of the angle of the mouth.

The qualitative composition of *Candida* fungi in the various biotopes of the oral cavity are presented in Table 1.

TABLE I.

| Candida fungi        | The studied biotopes of oral cavity in patients with diabetes mellitus type 1 |               |                    |                    |                       |                     |
|----------------------|-------------------------------------------------------------------------------|---------------|--------------------|--------------------|-----------------------|---------------------|
|                      | tongue mucosa                                                                 | Cheeks mucosa | Hard palate mucosa | Composite fillings | Tooth-gingival groove | Mucosa /skin border |
| <i>C. albicans</i>   | 94,4 %                                                                        | 100%          | 100%               | 100%               | 100%                  | 83,4 %              |
| <i>C. crusei</i>     | 5,6%                                                                          | -             | -                  | -                  | -                     | -                   |
| <i>C. tropicalis</i> | -                                                                             | -             | -                  | -                  | -                     | 8,3%                |
| <i>C. kefyr</i>      | -                                                                             | -             | -                  | -                  | -                     | 8,3%                |
| General quantity     | 69,2 %                                                                        | 61,5 %        | 38,5%              | 15,4%              | 11,5%                 | 46,2%               |

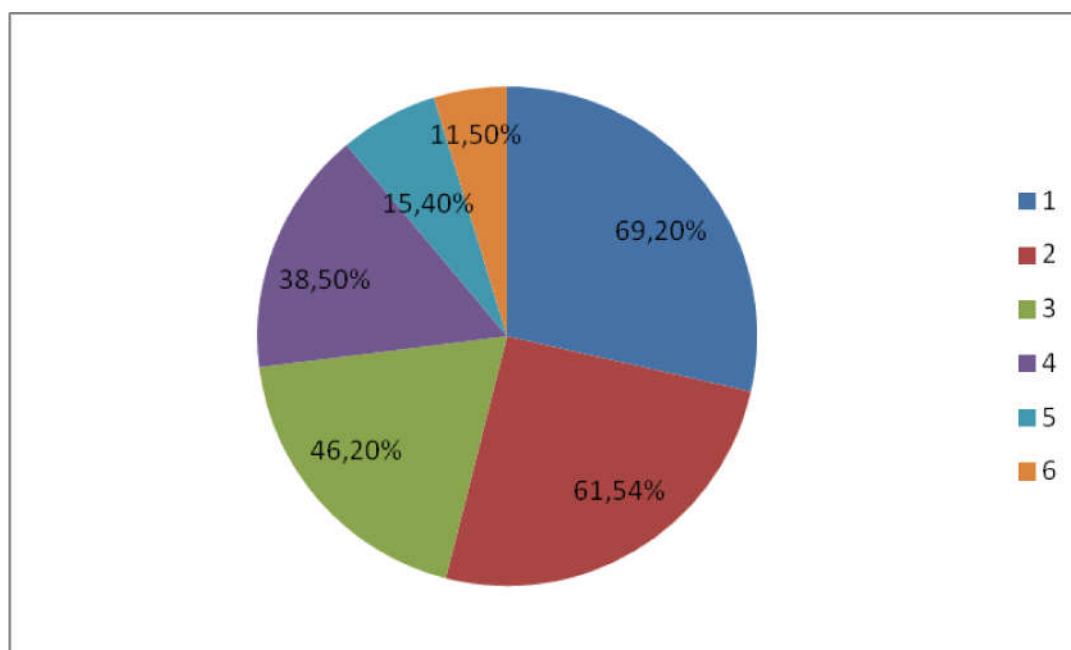


Figure 2. Quantitative composition of *Candida* fungi in different biotopes of the oral cavity in patients with diabetes mellitus type 1:

1 - dorsal area of the tongue mucosa; 2 - retromolar area of the cheeks mucosa; 3 - the angle of the mouth (mucosa and skin border); 4 - hard palate mucosa, 5 - tooth - gingival groove; 6 - composite fillings of tooth contact surfaces.

#### CONCLUSIONS.

1. Fungi of the genus *Candida* on the mucous membrane of the oral cavity in patients with diabetes mellitus I - type were found in 64,58% of persons (58,33% of patients was suffering from candidiasis of the oral cavity and 6,25% of patients was belonging to candida-carriage).
2. The most frequent localization of the genus *Candida* representatives in the oral cavity in patients with diabetes mellitus of the first type was the mucous membrane of the dorsal surface of the tongue, cheeks and mouth corner (mucous and skin border).
3. *Candida albicans* is the most common representative among identified *Candida*'s in all investigated oral biotopes (88,5%).

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