

# Oral *Candida* colonization in diabetic individuals non-carriers of dental prosthesis

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## INTRODUCTION

The men's oral cavity's flora is a complex ecosystem, composed by several microorganisms that may cause infections when the immune system is weakened.<sup>1,2</sup> The presence of *Candida* is very common and although they are commensal, they can become pathogenic. This yeast-like fungus is responsible for the appearance of candidiasis in man, which arise due to nutrient imbalances, malignant diseases or metabolic disorders such as Diabetes Mellitus (DM)<sup>1,3</sup>. DM is a disease associated with uncontrolled blood glucose that leads to an increase of glucose in oral fluid and causes xerostomia, creating an environment conducive to the development of fungal infections.<sup>1,2,3</sup>

## OBJECTIVES

Evaluate the prevalence of *Candida* sp. in the oral cavity of diabetics and non-diabetics, both non-carriers of dental prosthesis; assess the virulence factors of *Candida* sp. associated to single species and bearer group and relate HbA1c values with colonization by *Candida* sp.

## METHODS

**Sample:** The study group included 117 individuals of both genders, both non-carriers of dental prosthesis, of which 66 were diabetic (study group) and 51 non-diabetic patients (control group).

**Collection of samples:** The collection of samples was performed at the University Dental Clinic of ISCEM and at the clinical analyzes laboratory-Lumilabo. After reading and signing the informed consent by the patients included in the study, a sample of the oral mucosa was collected with the aid of sterile swabs and included in transport medium. At the microbiology laboratory of ISCEM, the samples were inoculated in specific mediums and identified according to the phenotypic tests.

**Identification of *Candida* sp.:** The isolates were identified based on phenotypic methods: macroscopic and microscopic characteristics of the colonies on Sabouraud agar culture medium and chromogenic medium, and the species identification was subsequently confirmed by the biochemical profile (Figure 1).

**Statistical analysis:** For statistical analysis we used the SPSS program.

## RESULTS

### Sample characterization:

- The individuals aged 18 to 80 years were grouped according to the criterion "diabetic vs non-diabetic", and it was found 56,4% (n=66) were diabetic and 43,6% (n=51) weren't diabetic.
- The average age in the study group (diabetics) was 64,2 years and in the control group was 36,1.
- In the study group:
  - 65,2% (n=43) were male and 34,8% (n=23) were female.

### Presence of *Candida* sp.:

- The oral colonization by *Candida* sp. was detected in 43,9% (n=29) in the study group and in 17,6% (n=9) in the control group (figure 2).
- The diversity of the isolated yeast species in the study group was as follows: 33,3% (n=22) of *C. albicans*, 3% (n=2) *C. tropicalis*, 4,5% (n=3) mixed cultures of *C. albicans* and *C. tropicalis* and 3% (n=2) of *C. krusei* (figure 3).
- C. albicans* was the most prevalent species.
- The chi-square test showed significant difference between being diabetic and being colonized when compared to the control group ( $p = 0,003$ ).

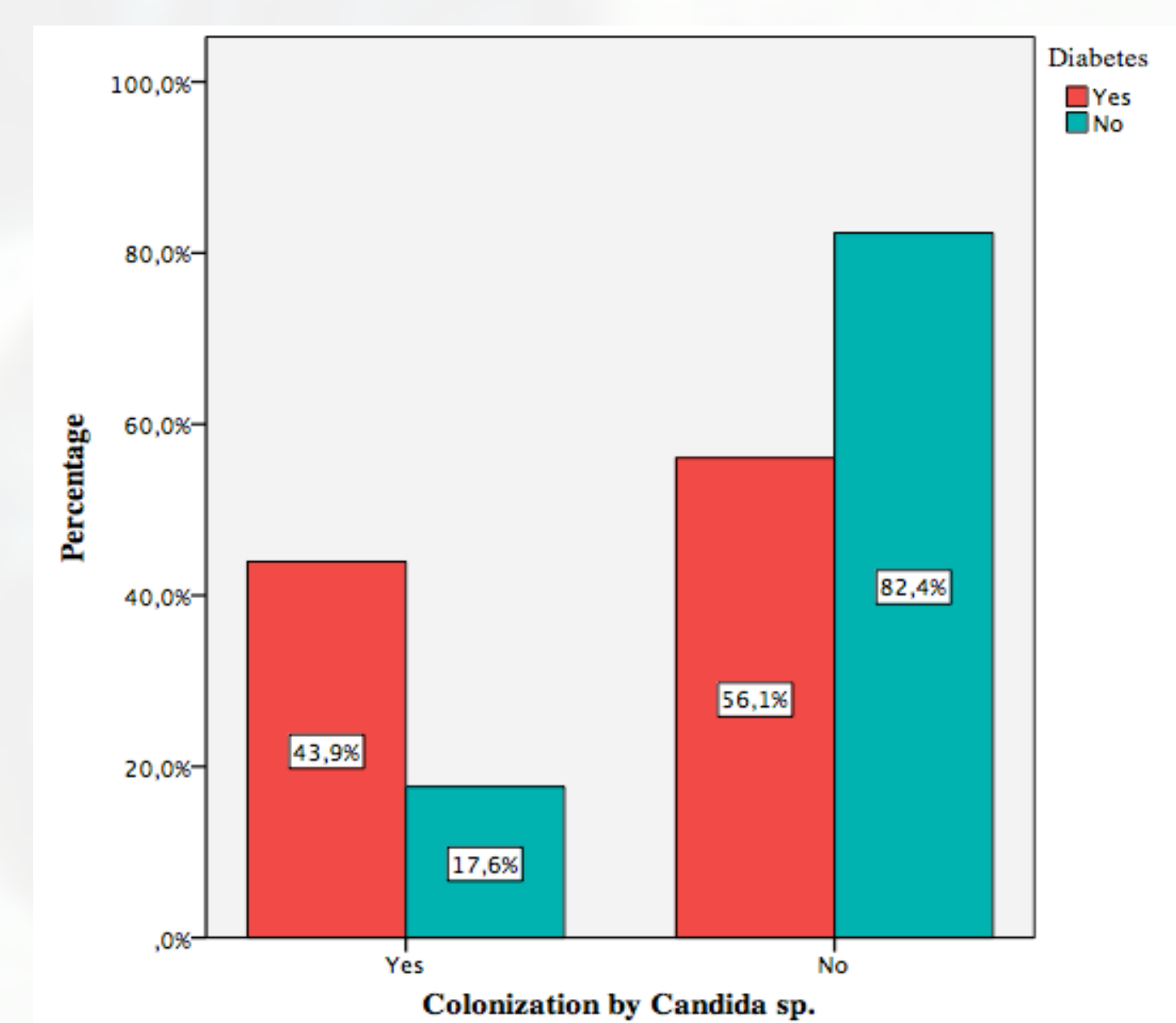


Figure 2. Presence of *Candida* sp. in the diabetic group and control group.

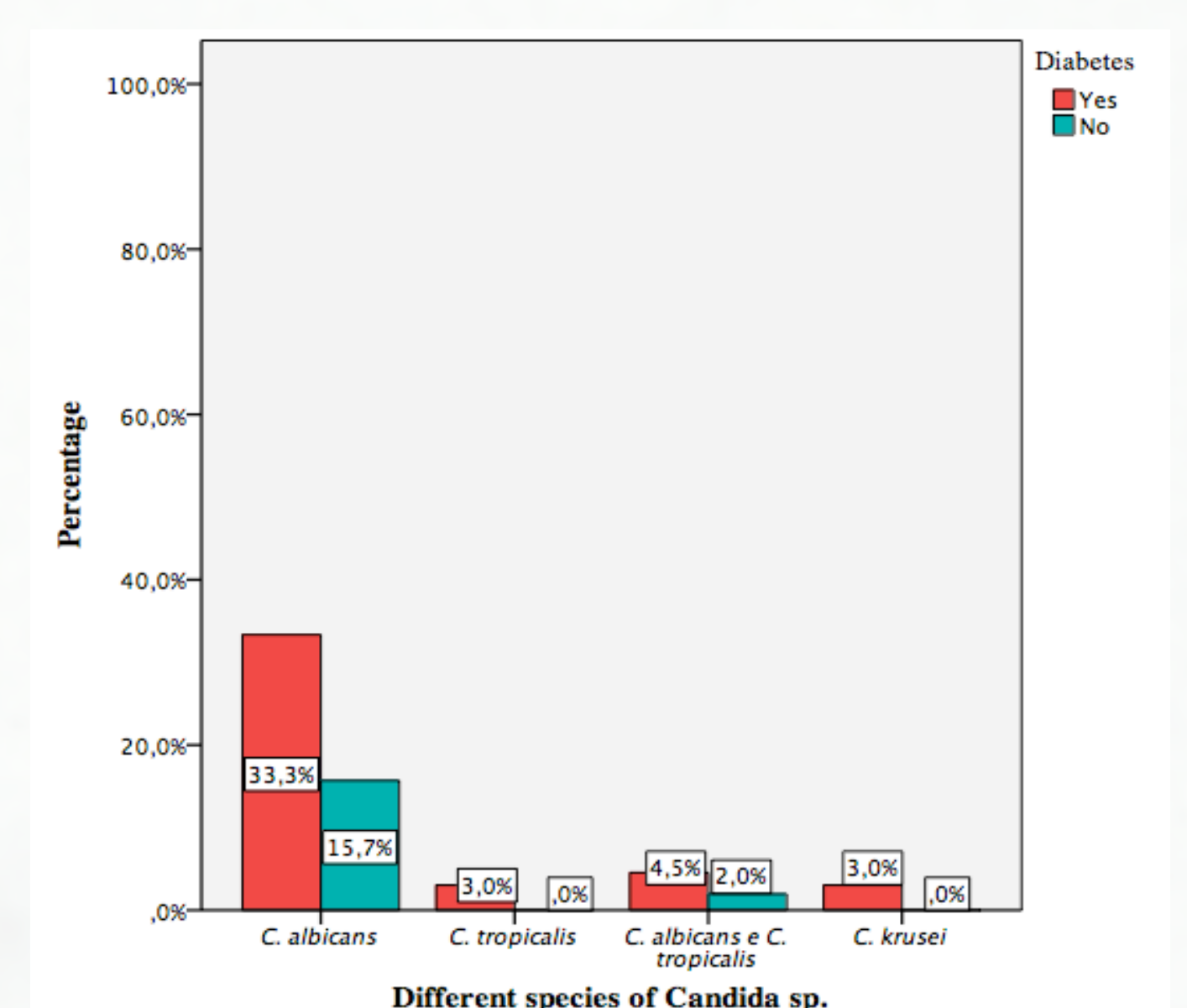


Figure 3. Presence of different species of *Candida* sp. in the diabetic group.

### Virulence factors: expression of proteases and phospholipases

- In the 38 isolates of *Candida* sp., 63.2% (n=24) showed no production of proteinases, 26.3% (n=10) showed production positive (+) and 10.5% (n=4) showed strong positive output (++) according calculating Pz (figure 4).
- In the 38 isolates of *Candida* sp., 12 strains (31.6%) did not express phospholipases and 26 (68.4%) produced these enzymes, in which 10.5% (N = 4) were weak positive (+), 36.8% (N = 14) were positive (+++) and 21.1% (N = 8) were strongly positive (++++), according to results of the calculation of the Pz (figure 5).

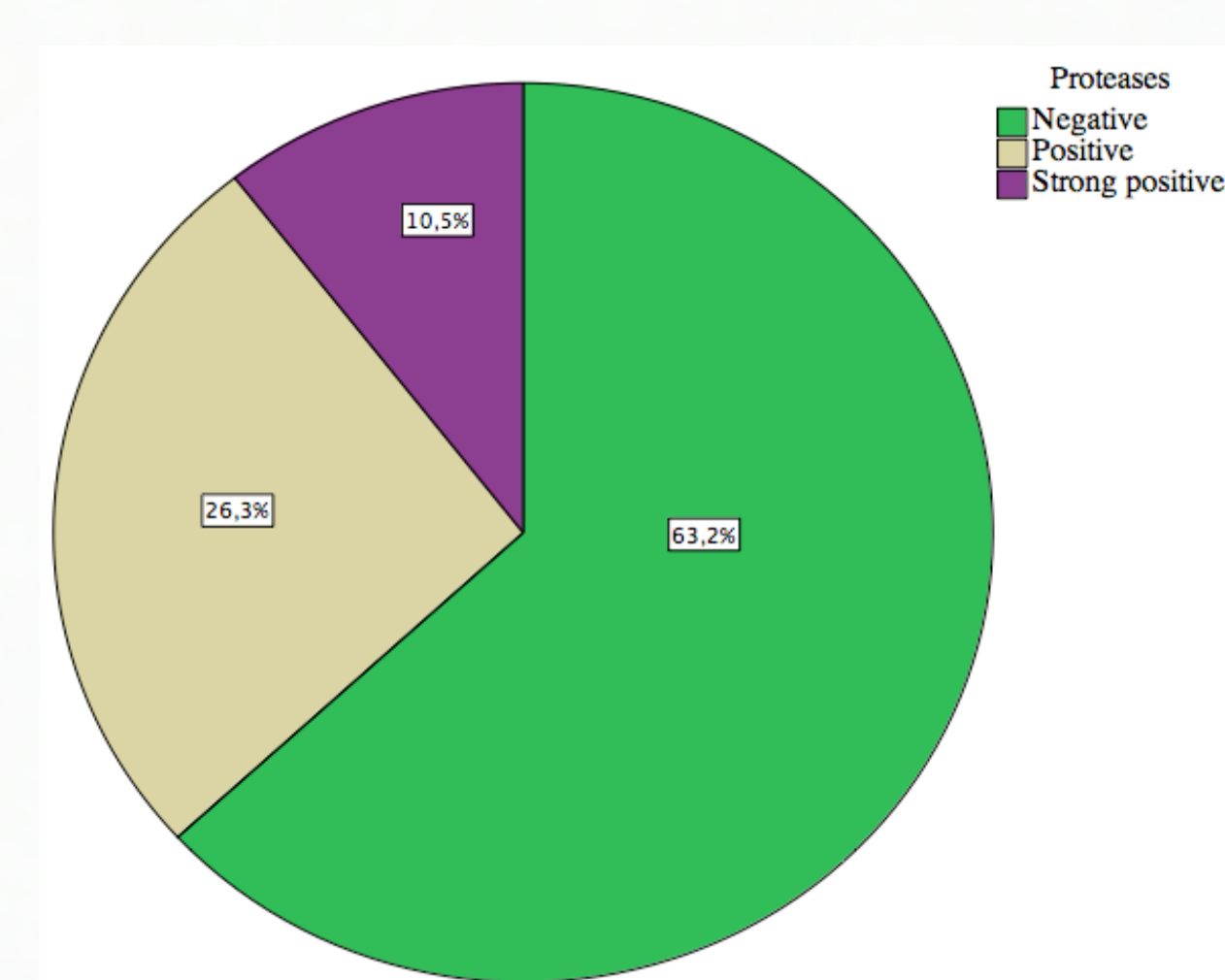


Figure 4. Expression of extracellular enzymes: proteases

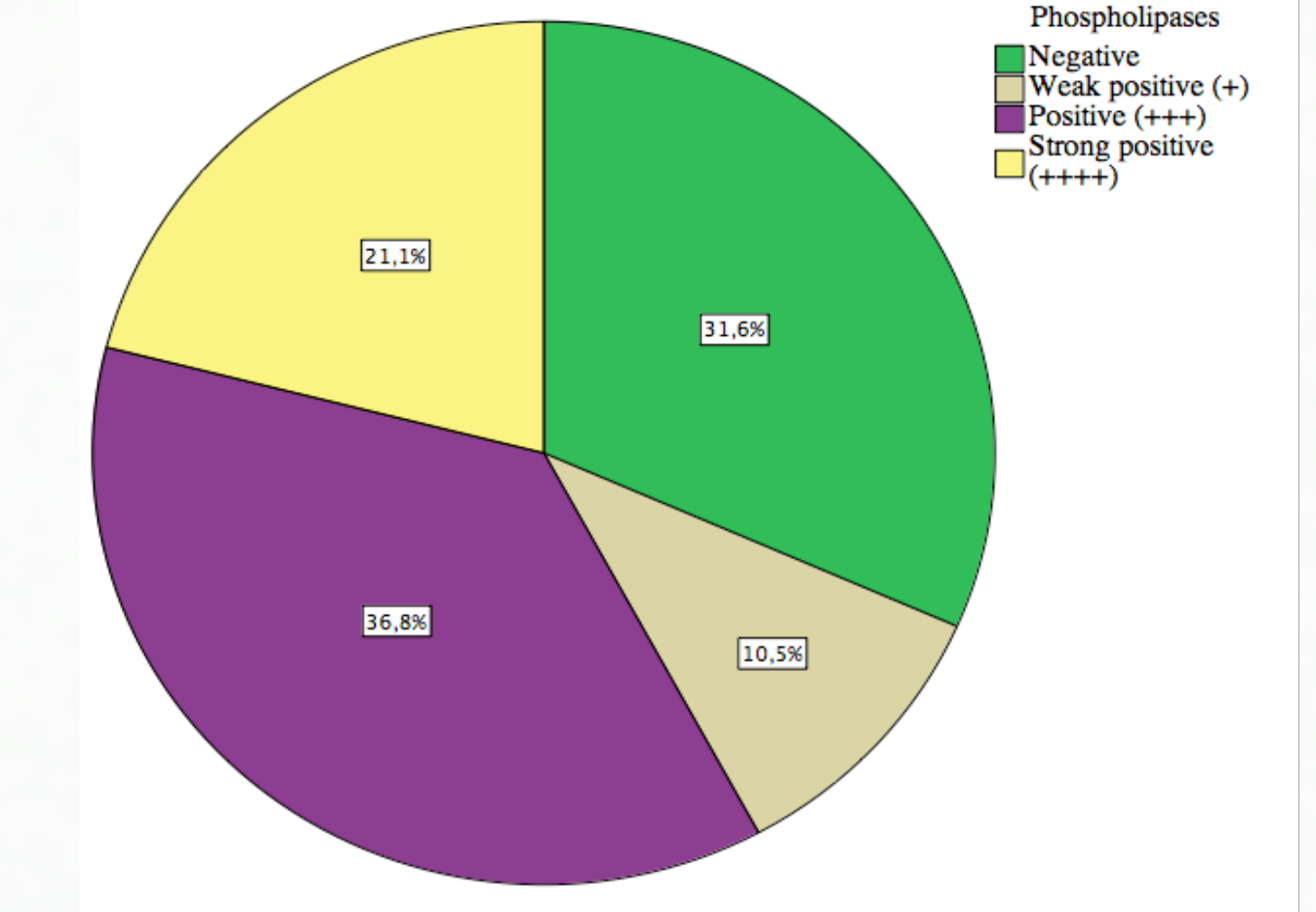


Figure 5. Expression of extracellular enzymes: phospholipases

- As for HbA1c  $\geq 6,5\%$  vs colonization by *Candida* sp., 67,9% had HbA1c  $\geq 6,5\%$  and were colonized and 72,4% had HbA1c  $\geq 6,5$  but were not colonized by these yeast fungi.

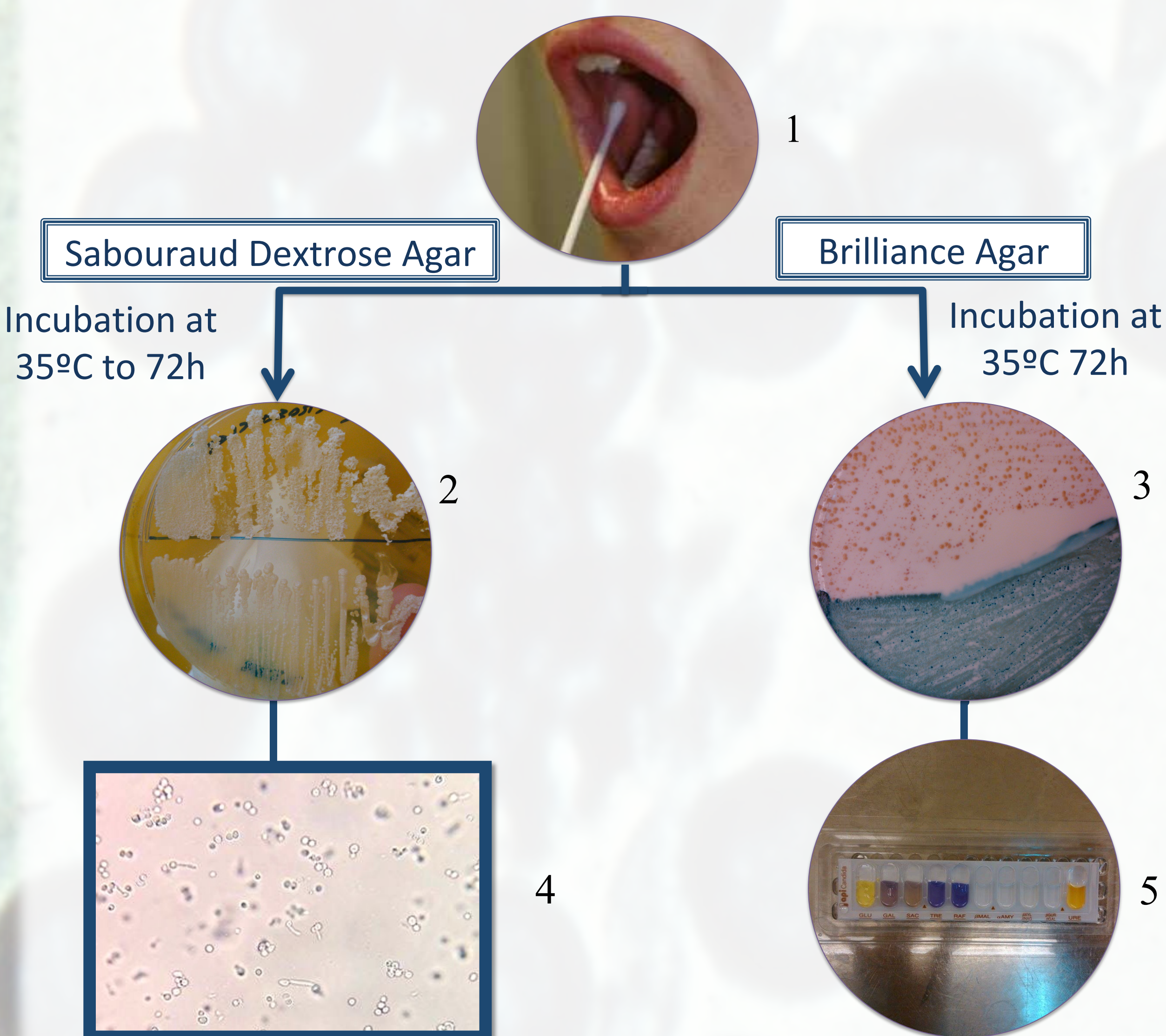


Figure 1. Laboratory Protocol: (1) Collection of samples with sterile swab; (2) Inoculation in Sabouraud medium; (3) Inoculation in differential chromogenic medium: Brilliance Agar (Presumptive identification of *Candida* sp, Green - *C. albicans*; Blue - *C. tropicalis*; Brown - *Candida* sp); (4) micromorphological identification (Blastese proof) - (400X amplification); (5) biochemical identification of *Candida* sp. (API *Candida* - Biomerieux®)

## CONCLUSIONS

- Being diabetic is an important factor for the colonization of *Candida* sp. in the oral cavity.
- C. albicans* was the most prevalent species and showed a great ability to express proteinases and phospholipases.
- The uncontrolled HbA1c does not have a statistical significance for colonization by *Candida* sp.

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