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IMPLICATION OF YEASTS IN FOOD TOXINFECTIONS

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Abstract

The frequency of the fungi infections, especially those determined by yeasts, has increased considerably in the last decade. The identification of the species from the pathologic products, and the testing of the susceptivity to antifungal became indispensable in choosing the right therapeutic attitude. Some fungi present both forms of growth and as a consequence they can exist either under the form of yeasts, or under the form of filaments, depending on the temperature. The stage of yeast is formed in the host tissue and in the culture developed at 37℃, and the stage of mold is observed in the cultures developed at temperatures between 25-28℃. These fungi are called dimorphic. But there are still micro-organisms that produce also yeasts and filaments, so that when two forms can co-exist and their appearance is not necessarily determined by the temperature. These fungi are called heteromorphic.

Key words: yeast, filaments, cultures

INTRODUCTION

In the digestive tube of the human being are found currently microscopic fungi from the species *Candida, Trichosporum,Rhodotorula, Turulopsis,Geotrichum,Saccharomyces*, some of them composing the intestinal microbiocenosis together with the aerobe and anaerobe bacteria. Other transitory groups can be of food origin. The proportion of fungi from the stool varies between 28-72%.

The important affecting of the capacities of local, general defense and great ecologic imbalances following some prolonged treatments with antibiotics with wide range can lead to the appearance of some intestinal mycosis. The mycosis diarrhea syndrome is characterized by stools of reduced consistency, even watery, accompanied by a fever or sub fever condition and digestive symptomatology consisting of burns and diffuse abdominal pain, inappetence and sometimes nausea.

The lack of tests of pathogenicity and of a specific pathology, make the etiologic involvement to be difficult, especially in the case of the species of *Candida*, *C.albicans*, *C.tropicalis*, *C.krusei.*

In the presence of a chronic digestive symptomatology, the dominance of the fungal elements in the pathologic product includes the micrologic

investigation of the stool is performed in two steps: the direct microscopic examination and the collecting.

Therefore it was performed the direct microscopy that is essential, consisting of smears fixed and gram colored. Following the accomplishing of smears was discovered the presence of the yeasts in large quantity and their" dominance" by comparing to the fecaloid bacterial flora diminished sometimes until the disappearance.

MATERIAL AND METHODS

We accomplished a prospective study, based on the microbiologic diagnosis registered in the bacteriological register of the laboratory of medical analysis, S.C. Diaser, Oradea.

The duration for which was extended the study is of 5 years, included in the period 01.01.2014-31.12.2019.

For the performing of the study was used also the archive, registered in the specific program of the computer from the laboratory of S.C. Diaser, Oradea, the computerized data base of the unit, respectively.

Necessary materials for the performing of the examination:

- A recipient of collection (collection recipient of fecal matter with collecting spoon) with transport medium
- Wood spatula
- Latex gloves

For the collection of fecal matter it has to be collected a sample of fecal matter of 5-10g introduced in the collection recipient of fecal matter with transport medium. If the stool is liquid, it will be collected 5 ml. It is recommended to be chosen a liquid, mucous and bloody portion, if there is one.

RESULTS AND DISCUSSIONS

The microscopic aspect is decisive for the collecting of the stool in order to isolate and quantify the yeasts. Always colored intensely gram-positive, depending on the taxonomic group they cover different forms, of spherical or oval yeasts disposed in crowds or moniliform chains often branched. The disposition and morphology suggests the species, for this reason the microscopy of the sample and afterwards of the isolated is essential in the mycological examination.

The isolation of the yeasts was made by cultivation on agar mediums that contain inhibitors for bacteria. The stages predecessor to the cultivation are identical to those for the bacteriological investigation, with the mention that the collection is made always from the stool made spontaneously.

Although there were visualized many mediums, in the literature there are only a few specifications in relation to the fungi from the fecal matters.

The Sabouraud CCG medium is highly selective allowing only the development of *C.albicans.* The Sabouraud DC version is less inhibiting, allowing also the development of other yeasts, so it has a wider application.

In order to incriminate the mycotic etiology in a diarrheic syndrome it is necessary for a quantitative examination of the yeasts, respectively the determination of the number of units that form mycotic colonies (UFC)/g or ml of fecal matters and the identification of the respective yeasts.

From the initial suspension of fecal matters, in isolated saline solution, are made dilutions 10^{-2} și 10^{-3} (respectively 10^{-3} și $10^{-4}$of product) of which, one by one 0,2 ml is seeded on a plate of Sabouraud DC by flooding. Also from the initial suspension are made dispersions with the loop on Sobouraud CCG.

The preliminary identification is based on the characteristics of the colonies and the microscopic nature (form, dimension, presence of capsule).

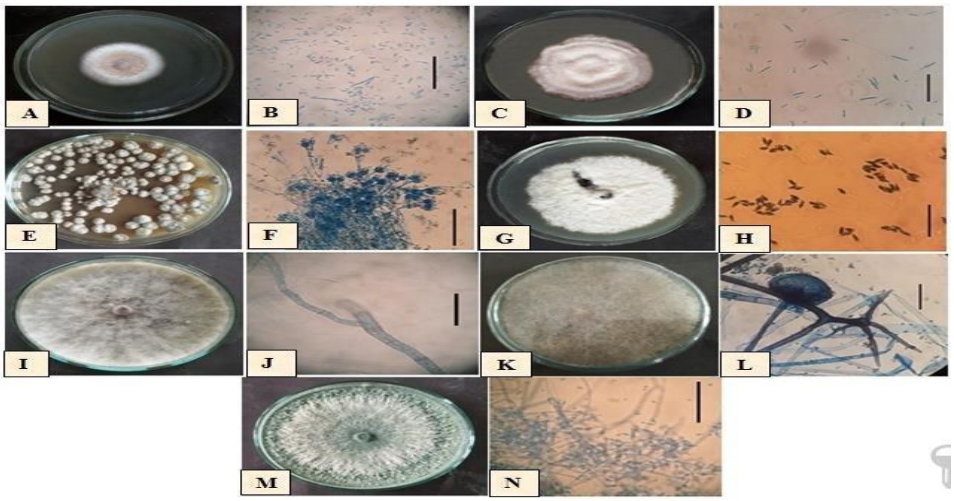

Figure 1. Flat colonies, Conidiophores and conidiasof*Fusarium moniliforme* (A-B), *Fusarium sporotrichioides (*C-D), *Penicillium sp.* (E-F), *Pestalotiopsis guepinii* (G-H); Flat colonies and sterile mycelia of*Rhizoctonia solani* (I-J), Flat colonies ,, *Sporangium* with sporangiospores of*Rhizopus stolonifer* (K-L) and*Trichoderma viride* (M-N). www.researchgate.net

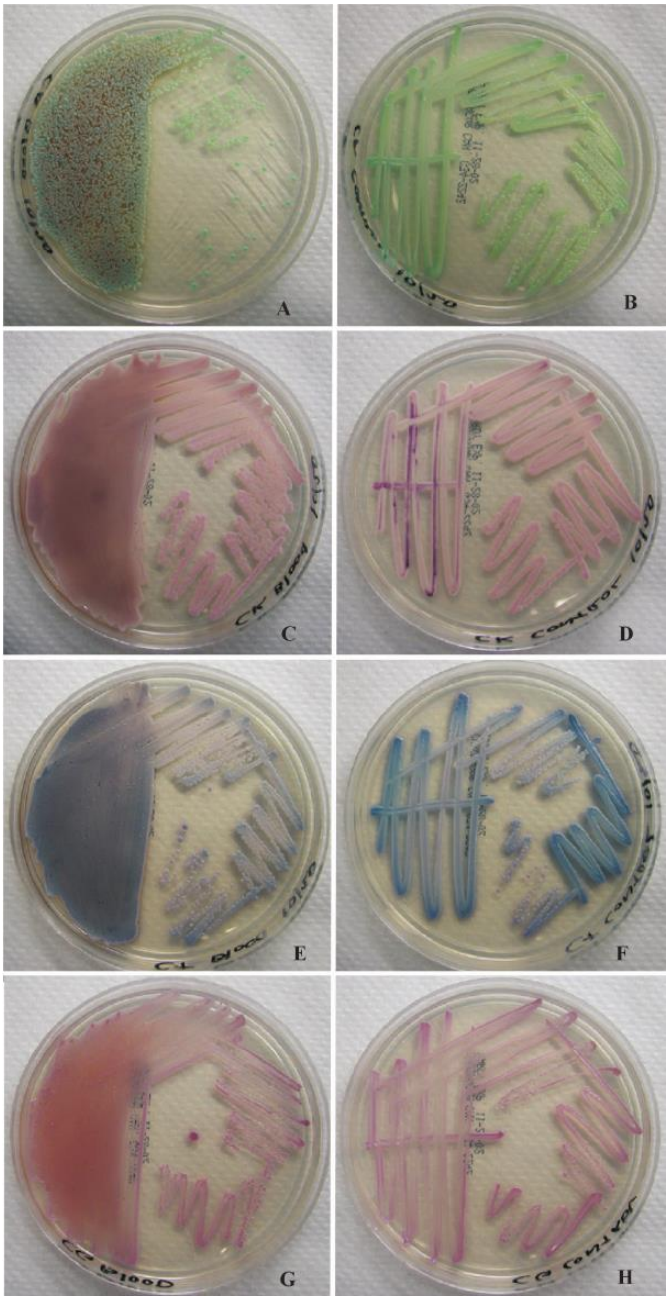

Figure 2. Colonii de*C. albicans* (A and B), *C. krusei* (C and D), *C. tropicalis* (E and F), and *C. glabrata* (G and H), mediul de cultură CHROM – agar
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The study regarding the "Immobilization of the filamentous fungi. A new frontier in the production of organic acids" highlight some fungal metabolites, primary or secondary, and also enzymes and other products of

biotransformation of fungal origin, that play a strategic role in many technologies and especially in the processing of the food. Among these, the organic acids seem to be of major interest. The citric acid is already produced in more than 3 tons/ year and the market demand for other acids, as gluconic, lactic and malic acids is in continuous increase. This review is dedicated mainly to the most recent progresses in the production of organic acids from the systems of immobilized fungal cells. The production of fumaric acid by immobilized *Rhizopus* arrhizus is reported as study of case. In fact, the fermentative production of this acid, that was for many years abandoned for economic reasons and replaced with the direct chemical synthesis, could benefit in a great measure from the utilization of a technology based on immobilized cells.

CONCLUSIONS

*Candida albicans*holds the major role in the mycotic etiology of the diarrheic. The presence especially in the immunodeficiency, represents one of the frequent undercurrent infections in AIDS. The aspects of cultivability of *C. albicans*are characteristic on agar Sabouraud CCG, being the only yeast that develops in such a degree of selectivity.

REFERENCES

1. ARUP Laboratories. Test Directory: Hemosiderin, Urine. www.aruplab.com 2010. Ref Type: Internet Communication.

2. Buiuc D., Neguţ M. 2009 - Treaty of clinical microbiology – 3rd edition, Ed. Medicală, Bucharest.

3. BENNETT J.B., DOLIN R., BLASER M. J. 2019 - Principles and Practice of Infectious Diseases, vol 2, Ninth edition, Churchill livingstone Elsevier.

4. Buiuc D. 2003 – Medical microbiology: guide for the study and practice of medicine, Ed. ”Gr. T. Popa” Iaşi.

5. Cepoi V., Azoicăi D. 2012 – Guide of management of nosocomial infections. Ed. Arte, Bucharest.

6. Constantiniu S., Ionescu G. 2005 – Acinetobacter gender in human pathology. Bacteriology, Virusology, Parasitology, Epidemiology, pp. 50:1-2, 157-173.

7. Crisan A., Nicoara E. 2015 - Course of Infectious Diseases, Ed. de Vest, Timișoara.

8. CORNELISSEN C. N. HOBBS M. M. 2020 – Microbiology, fourth edition, Lippincott Illustrated reviews.

9. Campfield T, Braden G, 2010. Urinary Oxalate Excretion by Very Low Birth Weight Infants Receiving Parenteral Nutrition. In Pediatrics, pp. 84(5):860-3.

10. CAROLL K.C., PFALLER M.A., LANDRY M.L., McADAM A.J., PATEL R. RICHTER S.S., WAENOCK D.W, 2019 - Manual of Clinical Microbiology, 2 volume, (ASM Books), 12th edition.

11. Dumitraşcu V., Laboratory Medicine. Biochemistry of urine, Editura Orizonturi Universitare, Timişoara, 2002

12. Earnest DL. Enteric Hyperoxaluria. In Adv Intern Med, 1979.LaboratorSynevo. Specific references to the work technology used in 2015. Ref Type: Catalogue. pp.24:407-27 (review).

13. Dumitraşcu V. şi colab. 2007 – Pharmacology –antimicrobial medicine, Ed. de Vest, Timişoara.

14. Engemann JJ, Carmeli Y, Cosgrove SE, et al, 2003. Adverse clinical and economic outcomes attributable to methicillin resistance among patients with Staphylococcus Aureus surgical site infection. Clin Infect Dis, pp. 36(5):592-598.

15. Francis JS, Doherty MC, Lopatin U, et al,2005. Severe community-onset pneumonia in healthy adults caused by methicillin-resistant Staphylococcus Aureus carrying the PantonValentine leukocidin genes. Clin Infect Dis, pp.40(1):100-107.

16. Fridkin SK, Hageman JC, Morrison M, et al, 2005. Methicillin-resistant Staphylococcus Aureus disease in three communities. N Engl J Med, pp. 352(14):14361444.

17. Głuszek, J., 1998. The effect of glucose intake on urine saturation with calcium oxalate, calcium phosphate, uric acid and sodium urate, International Urology and Nephrology, pp. 20 (6), 657-663.

18. GOERING VG, DOCKRELL HM, ZUCKERMAN M, CHIODINI PL 2019 – Mims Medical Microbiology and Immunology, Elsevier, sixth edition.

19. Garrity G.M., Bell J.A., and Timothy G.I. 2004 –Taxonomic outline of the Prokaryotes, Bergey`s Manual of Systematic Bacteriology –II-nd edn. Bergey Manual Trust, Springer, New York.

20. Heymann D.L. 2012 - Manual of transmissible diseases, Ed. Amaltea, Bucharest.

21. Holtmann H., Nitschke J. , 2017 – Basics Medizinische Mikrobiologie, Hygiene und Infektiologie, 4 Auflage, Elsevier GmbH Deutschland.

22. Hidron AI, Kourbatova EV, Halvosa JS, et al, 2005. Risk factors for colonization with methicillin-resistant Staphylococcus Aureus (MRSA) in patients admitted to an urban hospital: emergence of community-associated MRSA nasal carriage. Clin Infect Dis, pp.41(2):159-166.

23. Inglis T.J.J. 2007–Microbiology and Infection. Churchill Livingstone.

24. Jernigan JA, Stephens DS, Ashford DA: 2003, Industry-related outbreak of human anthrax, Emerg Infect, pp. 9: 1657-1658.

25. Kaplan SL, Hulten KG, Gonzalez BE, et al, 2005. Three-year surveillance of community- acquired Staphylococcus Aureus infections in children. Clin Infect Dis. pp. 40 (12):1785-1791.

26. Klevens RM, Edwards JR, Richards CL, et al, 2007. Estimating healthcare-associated infections and deaths in U.S. hospitals, Public Health Rep, pp.122(2):160- 166.