International Journal of Progressive Sciences and Technologies (IJPSAT)
ISSN: 2509-0119.

http://ijpsat.ijsht-journals.org
Vol. 26 No. 1 April 2021, pp. 36-39

Prevalence and Prognosis of Candidiasis among Covid-19 Patients: Data from ICU Department

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Abstract – Yeast species belonging to the Candida genus, including Candida albicans, Candida glabrata, Candida parapsilosis, Candida tropicalis, and Candida krusei, are the most prevalent fungal species inhabiting various mucosal surfaces, such as the skin and the respiratory, digestive, and urinary tracts [1]. Although being commensal within the human host, Candida species are equipped with virulence attributes, enabling them to invade when opportunities arise and cause various infections in humans, especially when the immune system is impaired.

We retrospectively studied total lymphocytes count and Candida infection in 142 patients who were admitted to TSMU The First university Clinic Intensive care unit department between 14.10.20 – 02.02.21 . Among 142 patients Candida spp were isolated in 15,4%(22/142) patients. In all this patients total lymphocytes count were low. Candidemia was not dectected. Candiduria was observed in 2 patients(9%, 2/22). Our data is close to the White, P.L. et al studies from UK which have reported 12.6%(17/135) of Candidiasis.

Keywords – Candidiasis, Covid-19, ICU Department, Lymphophenia, Treatment.

I. INTRODUCTION

The recent global pandemic of COVID-19 has predisposed a relatively high number of patients to acute respiratory distress syndrome (ARDS), which carries a risk to develop super-infections. Candida species are major constituents of the human mycobiome .Yeast species belonging to the Candida genus, including Candida albicans, Candida glabrata, Candida parapsilosis, Candida tropicalis, and Candida krusei, are the most prevalent fungal species inhabiting various mucosal surfaces, such as the skin and the respiratory, digestive, and urinary tracts [1,2]. Although being commensal within the human host, Candida species are equipped with virulence attributes, enabling them to invade when opportunities arise and cause various infections in humans, especially when the immune system is impaired [2]. Superficial infections, such as skin disorders; mucosal infections, including oropharyngeal or vulvovaginitis candidiasis; and invasive candidiasis are established clinical entities of candidiasis [3]. Candida is

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among the most frequently recovered pathogen in the intensive care unit (ICU), affecting between 6% and 10% of patients, and some studies have noted an increasing trend for candidemia [4]. The estimated mortality attributed to invasive candidiasis is 19–40% [5]. This mortality is even higher among ICU patients, approaching 70% [6]. Awareness of the possibility of fungal co-infection is essential to reduce delays in diagnosis and treatment in order to help prevent severe illness and death from these infections.

Despite the marked immune dysregulation inCOVID-19, no prominent defects have been reported in immune cells that are critically required for immunity to Candida. This suggests that relevant clinical factors, including prolonged ICU stays, central venous catheters, and broad-spectrum antibiotic use, may be key factors causing COVID-19 patients to develop IYIs. Cell types important for host defense against Candida, such as neutrophils and monocytes/macrophages, are not affected by SARS-CoV-2, suggesting that they are not responsible for COVID 19associated candidiasis (CAC). Similarly, an increased peripheral neutrophil-to-lymphocyte ratio was also observed in severe cases of COVID-19, and was likely associated with unfavorable prognosis[7]. The clear immune defect in patients with COVID-19 is, on the other hand, lymphopenia; however, an isolated decrease in lymphocyte numbers, as also experienced by HIV patients, is not associated with an increase in susceptibility to systemic Candida infections. The risk factors for CAC can be divided into two groups. The first group includes common risk factors predisposing ICU patients to invasive candidiasis. These include diabetes mellitus, renal failure requiring hemodialysis, abdominal surgery, triple lumen catheters, parenteral nutrition, receipt ofmultiple antibiotics, length of ICU stay >7 days, and prior abdominal infections [10,47,48]. Additionally, indwelling central venous catheters are widely used among COVID-19 patients residing in ICUs [8]. Indeed, catheters are historically known as a portal of entry for acquiring nosocomial Candidainfections, such as Candida auris and C. parapsilosis [9,10,11,12].

Corticosteroids have immunosuppressive effects on neutrophils, monocytesm and macrophages and predispose patients to invasive candidiasis. Lastly, whether the severe lung epithelium damage exerted by SARSCoV-2 facilitates Candida adherence to basement membrane causing subsequent invasive pulmonary candidiasis is not known. To date, primary Candida pneumonitis is considered to be rare.

Aim of our study was to analyze a connection between total lymphocyte count and Candida infection with surveillance rate in Covid-19 patients.

II. MATERIAL AND METHODS:

We retrospectively studied total lymphocytes count and Candida infection in 142 patients who were admitted to TSMU The First university Clinic Intensive care unit department between 14.10.20 – 02.02.21 .All of them needed mechanical ventilation. Tracheal aspirates , blood and urine were collected and processed for culture . All specimens were examined for the identification of bacteria and fungi for their sensitivity to antibiotics. The examinations were done in Laboratory for microbiology of TSMU The First University Clinic. Samples were brought to microbiology laboratory immediately and were processed within 30 minutes of collection. If a delay of more than 1–2 h was expected, the specimen was refrigerated (Urine and tracheal aspirate). Blood(10ml) were inoculated into signal blood culture bottles (Oxoid Ltd., Basingstoke, United Kingdom) . All specimens were cultured on blood agar, Macconkey and Sabouraud dextrose agar and incubated at 37°C for 24 h. All samples were subjected to the following: (a) gram stain of the colonies, (b) biochemical reactions by API identification system (API20E, API 20 NE, APIstaph, APIstrep, BioMérieux, France) and (C) identification and antimicrobial sensitivity test by Kirby-Bauer disk diffusion method. Fungi were tested for flucytosine, amphotericin B, fluconazole, itraconazole and voriconazole (ATB FUNGUS3 strips manual, BioMérieux, France).

III. RESULTS:

Among 142 patients Candida spp were isolated in 15,4%(22/142) patients. In all this patients total lymphocytes count were low. Candidemia was not dectected. Candiduria was observed in 2 patients(9%, 2/22).The patients with low levels of lymphocyte and Candida infection had unfavorable prognosis. We found that 1.patients with low levels of total lymphocytes and Candida infection had a poor overall survival. 2.Isolation of Candida in patients with low levels of lymphocytes, was significantly higher than that in patients with high level lymphocytes.3. Low level of lymphocytes was closely related with Candida infection in these patients, suggesting that impaired lymphocytes further induced Candida infection which is the member of the normal microbiota.

IV. DISCUSSION:

The extent of Covid-19 associated candidiasis (both superficial and invasive) varies by country and region. Studies from Spain[12] India [13], Iran [14], Italy [14], the UK [15], and China [16] have reported rates of 0.7% (7/989), 2.5% (15/596), 5% (53/1059), 8% (3/43), 12.6% (17/135), and 23.5% (4/17) [16]. Although a previous study from Iran indicated a relatively low level of oral candidiasis (OC) among patients with COVID-19 (53/1059), apparently that study included all the patients who presented with COVID-19 but not those developing ARDS, which may have resulted in an underestimation of OC in the context of COVID-19 [16].Our data is close to the studies White, P.L. at all from UK have reported 12.6%(17/135).

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