Oral Candidiasis in Chronic Kidney Disease

Mustafa Naeem N.AL- Sarray[1], Abdul Basit A. Sammed Abdulla[2], Muhamed Ali Al Kabe[3]

[1]Veterinarian, [2]Professor, at Department of Microbiology, College of Medicine, University of Wasit, Iraq,
[3]Physician at Al-Zahraa Teaching Hospital, Wasit, Iraq

Abstract

Objective : The study aims to : 1.Identification and isolation of candida spp in Patients with renal dialysis. 2.To identify the relationship between some important parameters(age , gender ,other disease) associated with chronic kidney disease and oral candidiasis. 3.Study of antifungal susceptibility profile for *C. albicans* in oral candidiasis. This study was performed in AL- Zahraa Teaching Hospital (Kidney Center) Wasit Governorate during the period from the first of December 2018 to the end of July 2019.The samples were collected from oral swabs ,then cultured on sabouraud dextrose agar (SDA) , examined under microscope to show hypha and pseudohypha of Candida spp and cultured on chrom agar for identifying the *Candida* spp. The molecular methods that used in this study were vitek 2 system and Polymerase chain reaction(PCR). The results showed that from 50 oral sample from Patients with renal dialysis 24 (48%) infected with Candidiasis 20 (83.3%)was *C.albicans* and 4 (16.7%)other *Candida* Spp (*C.Famata*, *C.Prosabilosis* and *C.Tropicalis*) , while 26 (52%) non infected. There is not relationship between the age ,gender and other disease in chronic kidney disease and the infections with oral candidiasis.

Keywords: *Oral candidiasis ,Chronic Kidney diseases, Candida albicans*

Introduction

Patients with chronic kidney failure have disturbances of immune function involving both innate and adaptive systems. These result in both immunodepression which increases susceptibility to infection and immunoactivation leading to a chronic inflammatory state. Dialysis treatment may further aggravate aspects of this, especially the induction of inflammation. In addition, there is a growing number of patients who have returned to dialysis programmes following transplant failure. Many of these will have been intensively immunosuppressed, often over years or decades. These patients are at particular risk [1]. The colonization can cause oral candidiasis, which can progress to its more invasive form, esophageal candidiasis. Moreover, if the immunosuppression continues or becomes stronger, it will continue to be a risk factor forsystemic candidiasis [2]. Renal failure can cause defects in cellular and humoral immunity by affecting T-lymphocyte subsets. Uremia causes a decrease inphagocytic activity of macrophages, [3].

Immunocompromised are a condition where the mechanism of host defenses are impaired (weakened or absent) by primary (congenital) or secondary(acquired) causes [4] and these Immunocompromised hosts include diabetes , neutropenia ,,burns, persons with intravascular catheters , patients undergoing hemodialysis , abdominal surgery , persons with parenteral nutrition , immunocompromised individuals can frequently suffer from recalcitrant infections of the oral cavity. These oral infections with Candida species are termed “oral candidiasis” (OC). Such infections are predominantly caused by *C.albicans* and can affect the oropharynx and/or the esophagus of persons with dysfunctions of the adaptive immune system [5] .Diagnosis of Candida in the laboratory is done by simple microscopy, culture or antigen detection assays. The wet mount microscopy detects budding yeasts cells and hyphal or pseudo hyphal forms. They also grow well on routine culture medium and on gram-stain, appear gram positive and oval in shape. The culture media that used is sabouraud

Corresponding Author:
Mustafa Naeem N.AL- Sarray
Veterinarian at Department of Microbiology
College of Medicine, University of Wasit
e-mail: mustafaalataby92@gmail.com

dextrose agar with chloramphenicol (antibiotic) are used . Creamy colored colonies are seen on the agar ; making the slide from these colonies and examine ,the yeast cell and pseudohyphae under the microscopes seen [6] .Then use Several techniques for confirmation like the The Vitek 2 system ,first introduced a fluorometric and then a colorimetric card for the rapid identification of yeast species. The performance of both cards has been evaluated in several studies [7-11] . In contrast, during routine diagnostics, yeasts are also commonly isolated on other medium , including CHROMagar Candida [12] . PCR is a crucial tool in the diagnosis of human pathogens. This molecular method is based on nucleic acid amplification, and hybridization has been rapidly adapted to reliably detect a broad range of infectious agents. The use of PCR to diagnose medical mycoses has been challenging, however, because fungi have cell walls that impede the efficient lysis of organisms and liberation of DNA (which can lead to false-negative PCR results) and because some human pathogens are also ubiquitous in the environment (leading to false-positive results[13] .

Material and Method

Study design:

This prospective study was performed in AL- Zahraa Teaching Hospital (Kidney Center) Wasit Governorate during the period from the first of December 2018 to the end of July 2019. 50 patient of CKD (male and female , age ranged from 17-80 years ,have been randomly selected from dialysis center in AL-Zahraa teaching hospital According to following inclusion criteria .

-(blood uria > 50 mg/ dc , criatinin >1.2 mg /dc , duration of illness ranged from few months to 7 years .

-exclusion criteria : negative medical history with normal blood uria and serum criatinin .

-physician diagnosis.

Procedure of samples collection :

Mouth swabs were collected by using a sterile disposable cotton swabs and rubbed over the tongue palate and buccal mucosa as outlined in appendix (1) Figure (1). Cotton swabs were aseptically dipped in sterile culture tubes containing transport medium and were transported as soon as possible to the laboratory and incubated at 37 ˚C for 24 hours [14] .

Isolation and identification of Candida species :

After taking swaps from the suspected patients , the swap samples were cultured immediately on SDA with chloramphenicol and incubated aerobically at 35-37˚C for 24-48 hours ,the agar plates were examined for visible growth after the incubation period [15] . Identification of *Candida* was done based on the colony morphology of the isolates, and then staining with gram stain and examined under the microscope to show the morphology of *Candida* spp. Then use Several techniques for confirmation like the The Vitek 2 system ,first introduced a fluorometric and then a colorimetric card for the rapid identification of yeast species (BioMérieux, France), CHROMagar Candida medium and the molecular method Polymerase chain reaction technique (PCR) technique was performed for detection *Candida albicans* based on 18SrRNA.

Statistical Analysis

All results obtained from the present study were entered and analyzed statistically by the statistical package for social science (SPSS) version 21 for Windows Software and Microsoft Excel 2007. Chi-square test and one way Analysis of variance (ANOVA) with least significant were used for the assessment of association between the variables studied. A value of $P < 0.05$ was considered statistically significant.

Results

Table 1 : Distribution of oral candidiasis in renal dialysis patients according to age

Age		Infected		Total
		Positive	Negative	
Young <30 year	Count	2	3	5
	% within age	40.0%	60.0%	100.0%
	% of Total	4.0%	6.0%	10.0%

Cont ... **Table 1 : Distribution of oral candidiasis in renal dialysis patients according to age**

Moderate 31-50year	Count	8	8	16
	% within age	50.0%	50.0%	100.0%
	% of Total	16.0%	16.0%	32.0%
Aged 51< year	Count	14	15	29
	% within age	48.3%	51.7%	100.0%
	% of Total	28.0%	30.0%	58.0%
Total	Count	24	26	50
	% within age	48.0%	52.0%	100.0%
	% of Total	48.0%	52.0%	100.0%

(P value > 0.05)

Table 2: Distribution of oral candidiasis in renal dialysis patients according to gender

Infected		**Gender**		**Total**
		Male	**Female**	
Positive	Count	17	7	24
	% within infected	70.8%	29.2%	100.0%
Negative	Count	17	9	26
	% within infected	65.4%	34.6%	100.0%
Total	Count	34	16	50
	% within infected	68.0%	32.0%	100.0%

Table 3:Distribution of oral candidiasis in renal dialysis patients associated with other disease

Other disease		**Infected**		**Total**
		Positive	**Negative**	
Healthy	Count	2	2	4
	% within other	50.0%	50.0%	100.0%
	% of Total	4.0%	4.0%	8.0%
Blood pressure	Count	15	18	33
	% within other	45.5%	54.5%	100.0%
	% of Total	30.0%	36.0%	66.0%
Diabetic	Count	1	0	1
	% within other	100.0%	0.0%	100.0%
	% of Total	2.0%	0.0%	2.0%

Cont ... **Table 3:Distribution of oral candidiasis in renal dialysis patients associated with other disease**

D.M & blood pressure	Count	6	6	12
	% within other	50.0%	50.0%	100.0%
	% of Total	12.0%	12.0%	24.0%
Total	Count	24	26	50
	% within other	48.0%	52.0%	100.0%
	% of Total	48.0%	52.0%	100.0%

(P value > 0.05)

Table 4: *Candida* species of current study

Study group	C. albicans Numbers . and percentage	Other Candida Spp Numbers . and percentage
Renal dialysis	20 (83.3%)	4 (16.7%)

Discussion

The present study states that the age of renal dialysis patients infected with candidiasis showed that there was no significant differences(P value > 0.05) between the 3 age groups, and the high percent were in moderate age patients (31-50 years)as shown in Table 1, this result agreed with Godoy et al., (2013) [16] when he mentioned that the more significant infected patients were over 45 years. But still no correlation due to various population samples and races. Uremia is associated with a state of immune dysfunction characterized by immunodepression that likely contributes to the high prevalence of infections among these patients as well as by immunoactivation resulting in inflammation (Kato et al., 2008)[1]. According to gender of infected patients ,17 (70.8%) of them were males and 7 (29.2%) were females , as clarified in Table 2 , this result disagreed with Godoy et al., (2013) [16] when he mentioned that 53% of samples were females and 47% were males, this might be counting on other factors like the number of dialysis sessions and immune states. The most common underlying diseases in renal failure patients infected with oral candidasis were hypertension and diabetes mellitus as Godoy et al., (2013) [16] stated. but in current study there was no clear relationship between underlying diseases and *Candida* infection as clarified in Table 3 . Diabetes and hypertension diseases that strongly predispose people to renal failure (Bakris et al., 2000)[17],but not necessary associated with oral Candidiasis as showed in current study. *Candida albicans* is the most dominant *Candida* spp. In Patients with renal dialysis, as clarified in Table 4 , this result agreed with Kerawala et al., (2010)[18] when he mentioned that 60% of *Candida* isolate is *Candida albicans* . *C. albicans* is the most common fungal species isolated from biofilms either formed on implanted medical devices or on human tissue (Kumamoto, 2002)[19]. A mortality rate of 40% has been reported for patients with systemic candidiasis due to *C. albicans* [20].

Conclusion

Candida albicans is the most dominant *Candida* spp. In Patients with renal dialysis. There is not relationship between the age ,gender and other disease in chronic kidney disease and the infections with oral candidiasis.

Ethical Clearance: The project plan displayed on the scientific committee and scientific ethical committee of Department of Microbiology, College of Medicine and Wasit health directorate and get approval

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Conflict of Interest: There is no conflict of interest

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