Oral Carriage Rate of Candida Species in Diabetic Patients

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ABSTRACT

Background: It is well known that oral carriage of Candida species increase in many situations, like obesity, debility, leukemia, viral infection, use of certain drugs in addition to diabetes mellitus.
Objective: find the relation between diabetes and its control on oral carriage of Candida.
Methods: Thirty four hundred oral swabs from diabetic patients 67% are females and 33% are males, 41.7% are type 1 diabetes and 58.3% are type 2.different culture media are used.
Results: we found that 37.9% of diabetics had oral carriage, older age group had more but the difference is not significant statistically P>0.05, in addition females carry more Candida than males P<0.05, while type of diabetes had no effect on oral carriage we found that control of diabetes had significant effect P<0.01.
Conclusion: There is high carriage rate of Candida species in oral cavity of diabetic patients 37.9%, the rate of carriage increase in females and those with poor control. Candida albicans is the most common type with all the associated factors.
Key Words: Diabetes, oral carriage, Candida

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Introduction

Candidiasis is an acute or chronic, superficial or disseminated mycosis caused by Candida species [(1)].
They are opportunistic fungi which fail to induce disease in most normal hosts but may do so in those with impaired defense system [(2)].
The most common predisposing factors are, under-nutrition, debility, poor sanitation, iron deficiency anemia, obesity, age, hematological malignancies, viral infections HIV, HSV,CMV, neutropnia, pregnancy, drugs e.g. antibiotics, steroid, oral contraceptive drugs, cytotoxics, chronic infections, tropical areas, trauma of the skin, and diabetes mellitus[(3)].
The history of Candidiasis dates back to fourth century BC when Hippocrates describe oral thrush, the initial discovery of the organism was made in 1839 by langenback [(4)].
The incidence of Candidiasis was increased since 1940 with the advent of antibiotics and other drugs and later on AIDS infection.
In diabetes increase carriage rate is recognized and was thought due to increase glucose availability[(5)], glycation induced alteration in T cell function[(6)], affected intracellular killing of granulocyte [(7)], and impair opsonisation[(8)].
This can be aggravated by wearing of artificial denture (mechanical damage)[(9)].
There is many stereotypes of Candida: albicans, tropicalis, krusei, glabrata, kefyr, parapsilosis, clusitaniae, norvegenesis,and viswanathii[(10)].
Candida proliferates in superficial layer of squamous mucosa; extra-cellular aspartic proteinase may play a role in virulence. Toxin production, tissue invasion and hypersensitivity state are assumed disease processes [(11)].
C. albicans is a normal commensal of the gastrointestinal and genitourinary tracts of the human being.
The frequency of carriage rate of Candida was highest in the mouth followed by vulvovaginal and then anorectal regions. C. albicans is the most common isolates followed by tropicalis and glabrata[(10).]

Methods

Specimens of 340 mouth swabs were taken from diabetic patients, 228(67%) are females and112 (33%) are males with an age between 10 and 60 years, attending diabetic clinic in the teaching hospital in Najaf from Jan. 2002 till Sept. 2002. .
The type of diabetes was stated according to WHO criteria of diagnosis of diabetes 1998.
41.7% of those are type 1 diabetes and 58.3% are type 2.
Swab collection done by using disposable cotton swab rubbed over the tongue, palate, and buccal mucosa, then dipped in sterile brain heart Infusion broth transported to the lab.
State of control of diabetes calculated as follow; Good when fasting plasma glucose less than 115 mg\dl. Accepted when less than 150mg\dl and poor when above 150mg\dl.
Culture media:
The following types are used:
1. Brain heart infusion broth.
2.Sabourauds-dextrose broth with chloramphenicol.
3.Eosin methylene blue agar.
4.Urea agar base.

5.Corn meal agar.
6.Sugar fermentation basal medium.
Swab incubated at 37C for 24 hours, next day incubated on both sabourauds dextrose agar and eosin methylene blue agar for 1-3 days for visible growth of Candida colonies, if no growth more incubation for 5-10 days, if no growth discarded as negative result.
Identification and confirmation of type of Candida species done according to conventional culture and biochemical tests
Statistical analysis:
Performed using chi square (x2) and standard normal distribution (z) tests

Results

Positive culture results found in 129 patients (37.9%) and the types of isolates found are albicans, tropicalis, krusei and glabrata.
In **Table-1** prevalence rate of oral carriage of Candida species in different age groups was 37.9%, highest in age group 41-60 (41%) and least in age group less than 20 years (24%), statistical analysis show that difference is not significant statistically (P>0.05).
In **Table-2** influence of sex on oral carriage rate of Candida species show that (46%) of females had positive culture result in comparison to (21%) in males and this result is significant statistically (P<0.01).
Table-3 show that in both males and females Candida albicans is the most common isolate (13% and 32% respectively) and Candida tropicalis came second (7.1% and 5.2%) and Candida glabrata(0% and 3.9%),and the difference between carrier rate of albicans and other types in females is significant(P<0.05).
Table-5 shows no difference of carriage rate between type 1 and type 2 diabetes (P>0.05).
In **Table-5** a comparison between different species of Candida in both type 1 and type 2 diabetes show that Candida albicans is still the most common in both (24% and 27%) than the tropicalis, krusei and glabrata with no significant difference in both types of diabetes (P>0.05).
that Candida albicans is still the most common in both (24% and 27%) than the **Table-6** show relation of glycemic control to oral carriage rate of candida and its different comparison to 11%) and this difference is significant (P<0.01).
Species in different age groups types. Those patients with poor control had much more possibility to carry Candida orally than those with good control (45.8% in ropicalis, krusei and glabrata with no significant difference in both types of diabetes (P>0.05).

Discussion

Oral carriage rate of Candida species in normal individuals is about 25-30%[10] while in Iraq lower results was noticed by alhussaini 14%[12] and higher results by amin 36%[13].Several previous studies had shown that the prevalence of Candida species infection to be greater among diabetics than normal persons[14],as reported in **Table-2**, prevelance rate of oral carriage is 37.9% with no effect of age on carriage rate (P>0.05), inspite that higher rate of carriage in age group 41-60,this is also found by tapper-jones *et al* 1981[9],while smits B.J.*et al*
1996[15]claim increase prevalence of Candida albicans with advancing age.
Influence of sex on oral carriage rate of Candida species show that females are more susceptible to oral carriage than males in our study (P<0.01) This is also shown by Barlow[14] and Anendorf[16] and the possible cause is hormonal difference.
Prevalence rate of different species of Candida in both sexes show that Candida albicans is the most common of them in both females and males, then tropicalis and after that krusei and glabrata.and the difference of carriage rate of Candida albicans to other species in females is significant (P<0.05) while it is not significant
in males and we could find no studies to compare.
Both type 1 and 2 diabetes had the same carriage rate of Candida species (P>0.05). Candida albicans still is more common than other types of Candida in both types of diabetes while Candida tropicalis is the second and then kruzei and glabrata which are less common, so the type of diabetes had no effect on oral carriage rate of Candida(P>0.05), a significant difference was reported between Candida albicans and other species of Candida (P<0.05)

***(Table 1)** The Prevalence Rate of Oral Carriage of Candida*

Age group	*no. of patients*	*no. of isolates*	*%*	*P value*
<=18	29	7	24	***P>0.05***
21-40	69	23	33	
41-60	203	85	41	
>60	40	14	35	
Total	340	129	37.5	

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***(Table 2)** The Influence of Sex on the Oral Carriage Rate of Candida Species*

Sex	***no.***	***Oral Carriage***	***%***	***P value***
Female	228	105	46.0	***P<0.01***
Male	112	24	21.4	
Total	340	129	37.9	

***(Table 3)** The Number and Percentage of Different Species of Candida Isolates in Males and Female*

Candia Species	***Female*** No.=228	%	***Males*** No.=112	%	***P value***
C albicans	75	32.9	15	13.4	*P<0.05*
C.tropicali	12	5.3	8	7.1	
C.krusei	9	3.9	1	0.9	
C.glabrata	9	3.9	0	0	

***(Table4)** Influence of Type of DM on Oral Carriage Rate of Candida Species*

Type of DM	*No.*	*Oral carriage*	*%*	*P value*
I	*142*	*52*	*36.9*	*P>0.05*
II	*198*	*77*	*38.9*	

***(Table 5)** A Comparison between Type1, Type2 Diabetes in the Percentage of Carriage of Different Species of Candida Isolates*

Candida Species	***Type1*** no.=142	*%*	***Type1*** no.=198	*%*	*P value*
C.albicans	35	24.7	55	27.8	p>0.05
C.tropicali	11	7.8	9	4.6	
C.krusei	1	0.7	9	4.6	
C.glabrata	5	3.6	4	2.0	

***(Table6)** The Relationship between the Degrees of Glycemic Control* and the Oral Carriage Rate of Candida Species

Glycemic Control	*no.of patients*	*no. of isolates*	*%*	*P value*
Good FPG<=115mg\dl	*42*	*5*	*11.9*	*P<0.01*
Acceptable FPG>=110mg\dl & <=150mg\dl	*130*	*47*	*36.2*	
Poor FPG>=150mg\dl	*168*	*77*	*45.8*	

in both types of diabetes, other studies do not cover this subject Glycemic control affect the oral carriage rate of Candida where better control leads to less carriage rate ($P<0.01$), similar results reported by Odd F C et al 1978 where 60 % of poorly controlled diabetics carried Candida orally [17], but Fisher BM et al 1987[18] report no significant relation between glycemic control and oral carriage rate of Candida, we think that high oral glucose level in poorly controlled diabetics predispose to this infection.

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