

Evaluation of oral candidiasis incidence in complete denture wearers in Bandar Abbas city with 3 methods of instruction: pamphlet, CD, Verbal

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Abstract

Introduction: Denture wearing can cause a variety of lesions in the oral cavity, but most of the problems can be prevented with maintaining healthy oral tissue, denture hygiene and follow up after the dentures delivery. The purpose of this study was the evaluation of instructional intervention effect on the incidence of oral candidiasis in complete denture wearers, and its association with age, gender and educational level in Bandar Abbas city.

Methods: The present study was prospective trial-analytic. Fifty one subjects evaluated as available who willing to be treated with removable complete denture for the first time. Sampling was performed with sterile swabs from mid hard palate before inserting denture. Swabs were placed in 2ml normal saline immediately. 50 μ l of normal saline was inoculated on CHROM agar candida medium. After 48-72 hrs colonies were counted and subjects divided to healthy, carrier, afflicted. In the absence of candidiasis subjects were divided in to three groups. One groups received verbal instruction, second group received pamphlet and the last group received CD. Second and third tests were repeated in the first week and fourth month after they worn dentures.

Results: The minimum rate of candidiasis was zero percentage among those who had been instructed verbally. The highest incidence (16.7%) was in those who were instructed by pamphlet. There was no difference between three groups in incidence of oral candidiasis ($P=0.21$). There was the same effect to negative the carriers before and after first intervention in three groups ($P=0.55$). Verbal instruction had significant effect in to negative the carriers in second intervention compared to the first time ($P=0.45$). There were no difference between types of instruction and age and gender ($P=0.62$, $P=0.62$). All of subjects were diagnosed candidiasis had under Diploma education (10.3). The relationship between the education level of subjects and incidence of oral candidiasis were significant statistically ($P=0.43$).

Conclusion: Hygiene instruction should be instructed in accordance the culture of the regions. Efforts to improve the education can promote health.

Key words: Oral Candidiasis, Denture, Pamphlets

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Introduction:

Candida - associated denture stomatitis is a very common inflammatory process affecting about 60% of the subjects carrier of a prosthesis (5). It shows diversity in terms of geographical areas. One of the causes of oral candidiasis is presence of denture (3).

Denture-related stomatitis mainly involves the palatal mucosa when it is covered by complete or partial denture (2).

The proportion of older people is growing faster than of any other age groups. As in developing countries, the proportion of the older population in Iran has dramatically increased during the last 2 decades. Not only chronic systemic diseases are prevalent in old age, but also has been seen poor oral health and high prevalence rate of oral disease. This increasing population needs to better living conditions. Oral health is a contributory factor that promotes comfort (10-15).

There has been a growing awareness among health professionals of the need to provide information to health consumers in a format that best meets their individual needs. These formats can include verbal and written instructions, audiotapes, videotapes, follow up phone calls, e-mail communication with their doctor; and websites to access further information. These delivery formats contrast to the provision of verbal information only at the time of discharge. It also has the potential to disempower consumers, as they are unable to refer to information after discharge or may not remember what they have been told (13). The three main methods of patient instruction used in medicine and dentistry are verbal, written, and videotapes (8,9).

Providing written information to consumers about 'after care' is one important strategy which has the potential to improve confidence among consumers to manage their own care (or the care of a family member) and seek appropriate follow up care; decrease stress and anxiety (13). Perhaps the main advantage of a video over other instructional methods is that it can be used repeatedly with no additional cost. Other advantages have been described as a convenience and clarity of demonstration of relevant material, with the opportunity for self-learning in privacy and comfort (9).

The aim of present study was evaluation of oral candidiasis incidence in complete denture wearers

in Bandar Abbas city with 3 methods of instruction: pamphlet, CD, and verbal instruction.

Methods:

This present study was designed as a prospective interventional-analytic study. Subjects were selected from Patients who referred in private practices and Bandar-Abbas dental school from November 2013 to June 2014. Fifty one subjects were selected according to following criteria:

1. Completely edentulous patients who never wore complete denture before.
2. Patients were clinically healthy (not medically compromised).
3. Patients had clinically normal oral mucosa.
4. Patients hadn't any clinical signs of Candida infection or any lesions.
5. Literate person at home for guidance and assistance in the implementation of the instructing provided to individuals.

Patients with following criteria were excluded from this study:

1. Individuals were currently taking antibiotics, anti-fungi, steroids or immunosuppressive drugs in the past 6 months.
2. Uncooperative patients in follow up visits
Irregular using of dentures
3. Xerostomia
4. Radiotherapy and chemotherapy
5. Iron deficiency

All subjects were informed and signed the consent forms approved by the Ethics Committee of the Faculty of Dentistry, Hormozgan University prior to their participation. Demographic information such as age, gender and education was recorded.

Before inserting dentures, without previous oral hygiene procedures and without being under any antimicrobial treatment; Samples were taken from mid-palatal with sterile cotton swabs (6). These samples were our control samples in this study. Swabs were inserted in 2ml sterile normal saline immediately (1-7). In molecular biology laboratory 50 µl of the samples were seeded in a Petri dish with previously prepared CHROMagar. Then samples spread with a sterile glass pipette on media. Samples were incubated at 37°C for 48 h in

CHROMagar™ media and up to 72 h to improve colony pigmentation (1,7). Four types of *Candida* were identified by pigmentation; *Candida Albicans* & *Dubliniensis* colonies appear green in CHROMagar, *C. Tropicalis* metallic blue, *C. Krusei* fuzzy pink and other species, white to mauve (16). Investigation of color changes in the culture made on CHROM agar *Candida* plates, germ tube formation test, clamidoconidi formation on corn meal Agar medium & tween 80 and heat tolerance test were utilized to definitively identify the species (7).

A macroscopic count of cfu was performed according to the color of the colony. Patients were classified according to the number of cfu as follows: negative (cfu/ml: 0), carrier (cfu/ml: <400), and positive (cfu/ml > 400) (17). If the first sample, any subjects were with candidiasis, they were excluded and treated by antifungal medications.

Subjects were divided in to three types in order to receive instruction: verbal, pamphlet, CD.

In order to prevent the transfer of microorganisms and fungi from laboratory to patients, we placed dentures in one part sodium hypochlorite 5% for 10 minutes (4). Then dentures were washed by normal saline. Other samples were taken 1 week (18) and 4 months (19) after inserting dentures. We asked about methods and frequency of cleansing dentures and oral mucosa that contact with denture and we recorded them. If patients were with candidiasis in the first follow up, we didn't take second follow up from them and treated them. Second and third samples were taken like the first samples.

Statistical analysis was carried out using SPSS 19. Chi-square analysis was performed to examine whether there was a difference between groups. P values less than 0.05 were considered significant statistically.

Results:

In this study, 51 subjects divided in three groups, each group included 17 subjects.

In first follow up- after 1 week- 1 subject from pamphlet group had oral candidiasis (Table 1).

This subject was treated and excluded the study. After 4 months, 2 subjects who were instructed by pamphlet and 2 subjects who were instructed by CD had oral candidiasis (Table 2).

There wasn't significant relation between oral candidiasis and the type of education (P=0.21).

Although the incidence of candidiasis in group that were instructed verbally was 0%, and the incidence of it who we instructed by pamphlet was 16.7%.

In the first intervention, 100% of carrier subjects who were instructed by pamphlet and CD, were negative while subjects who were carrier and instructed verbally, 66.7% were negative. According to Chi-square analysis, three types of instruction had the same effects to negative the carrier subjects in the first intervention after 1 week (P=0.55) (Table 3).

After second intervention, subjects who were instructed by pamphlet and CD hadn't any change in carrier status. But in verbal group, 100% subjects that were carrier, were health and improved their oral health. According to Chi-square analysis, there was statically significant difference between types of instruction to negative the carriers between first and second intervention (P=0.045) (Table 4).

Distribution of *Candida* spp. Identified

The Table 5 shows yeast species isolated from palatal mucosa. (Table 5).

Table 1. Results the incidence of candidiasis after 1 week

Type of instruction	Afflicted		Carrier		Negative	
	Number	Percentage	Number	Percentage	Number	Percentage
Pamphlet	1	5.9	2	11.8	14	82.4
CD	0	0	1	5.9	16	94.1
verbal	0	0	3	17.6	14	82.4

Table 2. Results the incidence of candidiasis after 4 months

Type of instruction	Afflicted		Carrier		Negative	
	Number	Percentage	Number	Percentage	Number	Percentage
Pamphlet	2	12.5	5	31.3	9	56.3
CD	2	11.8	5	29.4	10	58.8
verbal	0	0	3	17.6	14	82.4

Table 3. Negative status of carriers depending on the type of instruction after 1 week

Variable		Be negative					
		Carrier changed to negative		Unchanged carrier		Carrier change to afflicted	
Types of instruction	Pamphlet	1	100	0	0	0	0
	CD	2	100	0	0	0	0
	Verbal	2	66.7	1	33.3	0	0

Table 4. Negative status of carriers depending on the type of instruction between first and second intervention

Variable		Be negative					
		Be negative carrier		Unchanged carrier		Be afflicted carrier	
Types of instruction	Pamphlet	0	0	1	50	1	50
	CD	0	0	1	100	0	0
	Verbal	3	100	0	0	0	0

Table 5. Yeast species isolated from palatal mucosa

Species	Number	Percentage in all subjects (n=51)	Percent of the total sample identified as carriers or affected (n=26)
Albicans	11	21.6	42.3
Tropicalis	4	7.8	15.4
Dubliniensis	6	11.8	23.1
Krausei	6	11.8	23.1
Glabrata	5	9.8	19.2
Others	1	1.9	3.8

Gender

The rate of oral candidiasis in males was 5/3% and females were 16.7%. Although the incidence of oral candidiasis in females was more than in males, there wasn't any significant statistically relation between candidiasis and gender ($P=0.36$).

Age

The more incidence of oral candidiasis was in 45-60 years old (12.1%). The relationship between the age of subjects and incidence of oral candidiasis was not statistically significant ($P=0.62\%$).

Education level

All of subjects who were diagnosed candidiasis had under Diploma education (10.3). The relationship between the education level of subjects and incidence of oral candidiasis was statistically significant ($P=0.43$).

Comparison of diastolic blood pressure before anesthesia, and one minute, 3 minutes, 5 minutes and 10 minutes after anesthesia had a similar pattern for changes and there was no significant difference between the two groups. ($P>0.05$).

There was a significant difference between the groups in terms of Apgar score which was lower in the Ondansetron group. This difference was observed at all times, including 1 minute ($P=0.028$), five minutes ($P=0.001$) and ten minutes ($P=0.019$) after operation. Also, a significant difference was observed within the two groups at different times in terms of Apgar score, which indicates with the increase in time, the Apgar score also increases (Table 4).

Of 106 patients in the dexamethasone - metoclopramide group, no one developed vomiting; and of 106 patients in the ondansetron group, only 5 patients (4.7%) developed vomiting. There was

no significant difference between the two groups of dexamethasone-metoclopramide and ondansetron ($P=0.060$) (Table 5).

Only 2.4% of all 212 patients developed vomiting; all of them were related to the group receiving ondansetron and complete control was observed in the group receiving dexamethasone-metoclopramide. Only 1-2 episode of vomiting was observed (near-complete control) and there was no incomplete control or lack of control. Fisher's exact test showed no difference between the two groups in terms of the number of vomiting (Table 6). About 11.3% of patients developed nausea which was not significantly different in the two groups ($P=0.665$) (Table 5).

Conclusion:

In this study, we found the relationship between incidence of oral candidiasis and types of hygiene instruction, gender and age was not significant, while relation between educational level and oral candidiasis was statically significant.

Researchers and dentists always consider Patient's instruction who use prosthesis to overcome problems caused by denture. They suggested many methods to instruct them. The three methods of patient's instruction are used in medicine and dentistry are verbal, printed materials and videotapes (9).

We evaluated the role of denture in incidence of oral candidiasis and subjects were evaluated who hadn't worn any prosthesis before this time. We evaluated them in two interval since inserting dentures. Our method was similar to Garg's study and et.al in 2012. Follow-ups in our study designed after 1 week and 4 months while Garg designed follow-ups in 1 & 4 days that was much shorter than our study. Garg revealed less than 20% of subjects showed positive growth of yeasts but didn't mention this amount of yeast growth is in normal or beyond the normal range.

There wasn't relation between incidence of oral Candidiasis and gender. The most species of *Candida* in oral cavity and candidiasis was *Albicans* in our study. The results were similar to the study that Tavakol did in 2001. Rate of incidence of candidiasis in our study was 9.26 that was very lower than Tavakol's study (80%). Those subjects

who hadn't worn any prosthesis before this time were included in our study and this was reevaluated after using their dentures maximum after 4 months (maximum time), while subjects in Tavakol's study worn prosthesis for minimum 1 year. The long time of wearing dentures may be a major reason for different rates of candidiasis in our study and Tavakol's study. Further more in Tavakol's study, candidia carriers weren't evaluated.

There wasn't relation between candidiasis and age but the educational level was related with candidiasis. Our results about educational level were similar to that of Nalc's&Baran's study in 2008 but the results conflicted in gender and age. As of Tavakol, Nalc & Baran evaluated subjects who wore dentures before study was done, too. The size of samples was bigger than our study.

There wasn't significant difference between types of instruction and incidence of candidiasis. This result was similar to Lim and et.al 1996 and in contrast to Lees & Rock in 2000. Lim found the instruction improved gingival health indexes, but type of instruction didn't effect in gingival health. The advantages of Lim's study are bigger size of samples and longer follow-up time. In our study, verbal instruction had significant effect to negative the carriers in second intervention compared to the first time. Lees & Rock found video method was the most effective and the written method was the least effective. The difference of Lees's study with our study and Lim was the questionnaire that evaluated knowledge of subjects. Different studies revealed different results. In present study, some subjects didn't watch CDs, despite emphasis on watching them when they received their dentures. This issue can distort the results.

Most species of *Candida* reported *Albicans* and followed by *Dubliniensis*&*krusei*, *Glabrata*, *Tropicalis* and others. Burket's 2008 reported most species in candida infections, are *Albicans*, *Tropicalis* and *Glabrata*. *Candida Albicans* was the most frequently isolated species in Zarembo study. Two other species were found apart from *C. Albicans*, namely *C. Glabrata* and *C. Krusei*. One of the reasons that *Dubliniensis* hasn't been found in some studies, it's colony color is similar to candida colony. To detect *Daubliniensis* should do heat tolerance test or PCR. We used heat tolerance test

after growth green colony in CHOROM agar candida and detected it.

The tissue surface of the dentures usually shows micropits and microprossities that harbor microorganisms that are difficult to remove mechanically or by chemical cleansing (4).

Materials used in making prosthesis, can influence the formation of plaque on them. Since samples were collected from Bandar-Abbas city, acrylic resin are used were different. Difference in denture acrylic resins, can provide different levels of porosity in dentures. Thus, candida adherence to dentures will be different.

Limitations:

1. Failure to exclude smokers: Because many of subjects in area are smokers.
2. Lacking the required criteria among the population was the main cause of our small samples.

Suggestions:

1. Studies in this method are recommended but with longer follow ups. May be with time, incidence of candidiasis will increase, differences between groups will become significant and the most effective methods in long term will be distinguished.
2. Foam patches or saliva collection is used for sampling to increase accuracy in colony count.
3. Since some people had no interest in their instruction, it's better When subjects receive their dentures, are displayed CD for them once if they don't watch CDs, don't be distorted results.

Hygiene instruction should be instructed in accordance culture of the regions. Other methods to be institutionalized in society to people benefit from the advantages. Efforts to improve the education can promote health.

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