

Assessment of Photodynamic Therapy and Miconazole in the Management of Denture Stomatitis

Mohamed Y Abdelfattah^{1,2,*}, Ahmed Abdelaziz Mohamed Essa³, Mohammed K Fahmi⁴

¹Prosthodontic Department, Faculty of Dentistry, Tanta University, Tanta, Egypt

²Prosthodontic Department, Faculty of Dentistry, Taif University, Taif, KSA

³Oral Pathology Department, Faculty of Dentistry, Tanta University, Tanta, Egypt

⁴Restorative and Dental Materials Department, Faculty of Dentistry, Taif University, Taif, KSA

*Corresponding author: m.yousef@tudent.edu.sa

Received January 15, 2018; Revised March 17, 2018; Accepted May 15, 2018

Abstract Objectives: Candida-induced denture stomatitis can be treated with different approaches; one of the most effective methods is the Photodynamic therapy (PDT). The current study aimed to assess the collective effects of PDT and low-level laser therapy (LLLT) in comparison to the topical application of miconazole gel. **Materials and Methods:** Thirty complete denture wearers with a history of Candida-induced denture stomatitis were haphazardly divided into two groups 15 patient each. Group I: The patients were subjected to a session of methylene blue-mediated PDT followed by to 2 sessions of (LLLT) 2 times per week for 15 days, while those of Group II: were subjected to miconazole gel four times per day for fifteen days. **Results:** The clinical and cytological findings revealed that 50% of the patients in Group I have been cured from denture stomatitis while in Group II the curing rate was 85%. After two weeks following treatment stoppage, 30% of Group I patients showed reappearance of symptoms while the ration of recurrence was 15% in Group II patients. **Conclusion:** Photodynamic therapy associated with low level laser therapy (LLLT) and Miconazole gel can be considered effective methods in the management of Candida-induced denture stomatitis with higher curing rate and lower recurrence ratio for Miconazole.

Keywords: photodynamic therapy, miconazole, denture stomatitis

Cite This Article: Mohamed Y Abdelfattah, Ahmed Abdelaziz Mohamed Essa, and Mohammed K Fahmi, "Assessment of Photodynamic Therapy and Miconazole in the Management of Denture Stomatitis." *International Journal of Dental Sciences and Research*, vol. 6, no. 3 (2018): 83-87. doi: 10.12691/ijdsr-6-3-6.

1. Introduction

Denture stomatitis is (DS) is chronic type of erythematous candidiasis that is connected with wearing dentures and becomes populated with candida. It is considered one of the most familiar situation with denture wearers and may be ranged from scattered or rough pinpoint erythema in the palatal mucosa. [1] Candida is well thought-out to be a latent source of this inflammation, [2] as it has the capability to stick on the denture surfaces and infect the palatal mucosa. [3] On the other hand, ill fitted unstable dentures, bad oral hygiene, salivary pH, elderly, sexual category, tobacco, and some systemic diseases can be considered predisposing factors. [4]

Candida-associated denture stomatitis can be diagnosed through the clinical and cytopathological examination. [2] Though Candida albicans is the most important pathogen correlated to denture stomatitis, different types of Candida had been identified, such as C. glabrata, C. tropicalis, and C. dubliniensis. [5] Currently, it is thought that mixed C. albicans and C. glabrata biofilms might significantly participate in the pathogenesis of denture stomatitis. [6]

Topical antifungals such as nystatin and miconazole are considered reliable treatments for denture stomatitis in addition to patient motivation about the importance of good oral and denture hygiene and avoidance of bad habits such as continuous wearing denture during sleeping. [3] While systemic antifungals e.g. fluconazole are usually described for patients suffering from systemic diseases. [7,8] There is no enormously successful management protocol for denture stomatitis, and the recurrence rate still high. [9]

Low-Level Laser Therapy (LLLT) has analgesic, anti-inflammatory, and curing effects. Low Level Light Therapy (LLLT) is a safe, low intensity (non-thermal) light therapy treatment. It improves tissue repair, immune response, reduces inflammation and pain in a wide range of medical conditions. The role of LLLT still uncertain, but earlier researches stated that Low-Level Laser light is captivated by definite endogenous chromophores in fungi leading to photothermal or photodynamic growth inhibition. [10,11] Different studies have been evaluated the effect of Photodynamic therapy (PDT) in the treatment of denture stomatitis. [12,13]

Although different previous studies evaluated the effects of PDT alone in the treatment of denture stomatitis,

the current study was established to evaluate the effect of PDT protocol followed by (LLLT) therapy compared to the topical effect of oral miconazole gel in the treatment of denture stomatitis.

2. Materials and Methods

2.1. Patient Selection

A total of 30 patients, with clinical and cytological evidences of denture stomatitis, (Figure 1) were carefully selected from out-patient clinics of the Department of Removable Prosthodontics, Faculty of Dentistry, Taif University, Taif, KSA, over a period from June 2016 to January 2018.

Cytological examinations were provided from selected patients with denture stomatitis after obtaining a written medical consent. The experimental protocol for examining patients and analyzing cytological specimens were reviewed and approved by the Ethical Board of Faculty of Dentistry, Tanta University.

This study was carried out involving patient's aged 45 to 70 years old using acrylic complete dentures. The presence of *Candida*, was confirmed through rubbing the mucosa of the palate with a cytobrush and spread on a clean, dry glass slide. Immediate fixation with 95% alcohol solution then slides was stained with PAS for the presence of candidal hyphae.

Exclusion criteria include patients with a history of recent antibiotic intake, pregnant, lactating women, smokers, and those with immunological disorders.



Figure 1. Clinical aspect of Denture stomatitis

2.2. Treatment Groups

Group I (Experimental group): The clinician and the patients attained the necessary laser protective precautions including safety glasses. Fifteen patients with denture stomatitis were subjected to one session PDT by rubbing the palatal mucosa with 0.01% Chimiolux methylene blue (Chimiolux, Hypofarma, Brazil) followed by to two sessions (20 seconds each) of diode Laser (FONA, CHINA) (Figure 2) at 660 nm, with a 100 mW/cm² power density, twice a week for 15 days. After finishing the first laser scanning, the affected area was irrigated using sterile

saline solution, and then it was cleaned and dried with sterile gauze. The second laser scanning was done using FONA laser alone. (Figure 3)



Figure 2. Dental LLLT unit



Figure 3. PDT and LLLT applied to the palatal mucosa

Group II (The control group): Fifteen patients were subjected to 20mg/g miconazole gel. 4 times per day for fifteen day. (Figure 4)

After a period of 15 days treatment, other clinical and cytological examinations were done for the entire patient in both groups by the same evaluator. The recurrence rates in both groups were determined 15 days after treatment completion.

Data were collected and statistically analyzed.



Figure 4. Miconazole oral gel applied on the fitting surface of maxillary denture

3. Results

At the end of treatment period, the clinical and cytological findings revealed that the curing of denture stomatitis was only observed in 50% in the collective treatment of methylene blue-mediated Photodynamic therapy and LLLT while it was 85% in the Miconazole group. (Figure 5 - Figure 7).



Figure 5. Post treatment results following Miconazole gel



Figure 6. Post-treatment results following PDT and LLLT

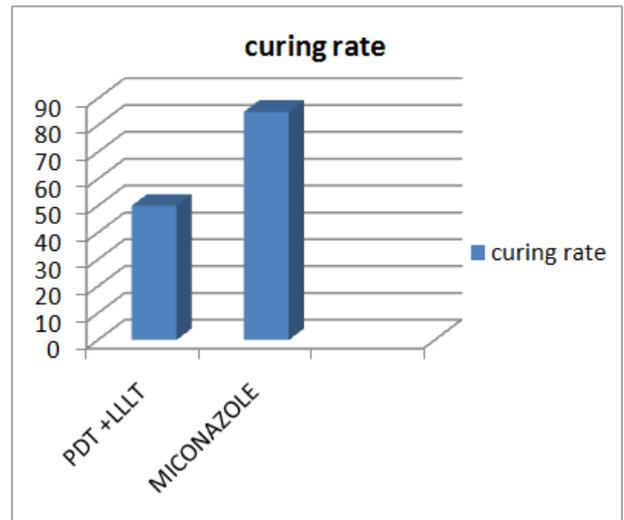


Figure 7. Curing rate in both groups

Considerable decrease in pain and burning sensation was seen in both treatment groups: 75 % of Group I patients (PDT and LLLT) and 90 % of Group II (Figure 8). In addition, a 65% drop in self-reported halitosis was detected in both groups (Figure 9) The reappearance of signs and symptoms of denture stomatitis were noted in 30% of Group I patients and 15% of Group II patients. (Figure 10).

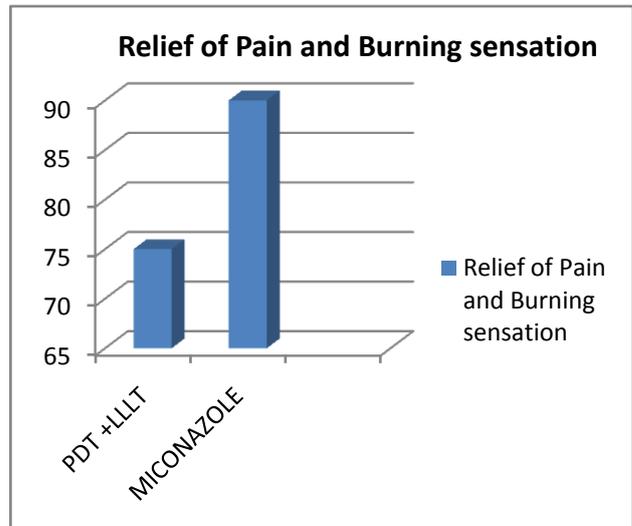


Figure 8. Relief of Pain and Burning sensation in both groups

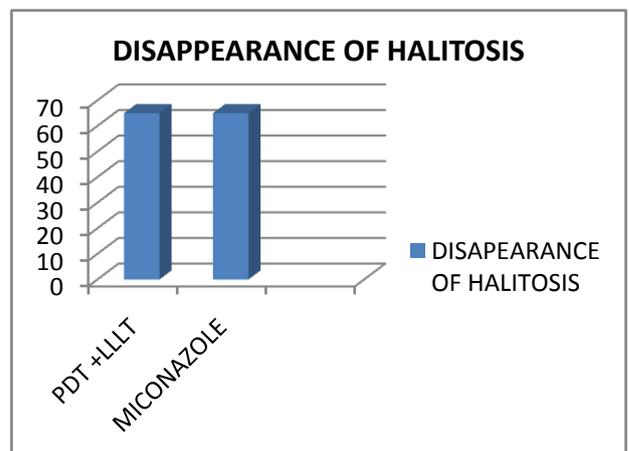


Figure 9. Disappearance of Halitosis in both groups

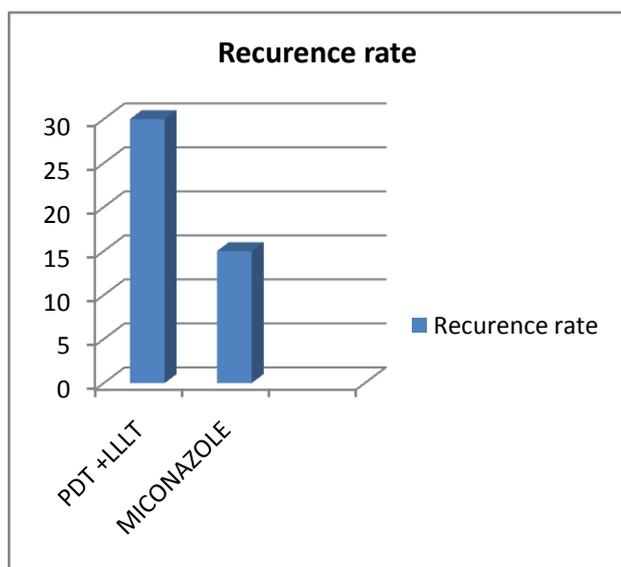


Figure 10. Recurrence rate in both groups

4. Discussion

The use of PDT protocol followed by (LLLT) therapy is a possible solution to overcome the side effects of conventional antifungal therapy for denture stomatitis.

The essential methods for the management of denture stomatitis consist of denture modification, removal of the denture during sleeping, and good denture hygiene, [14] Topical antifungal application has a transient curing effect followed by reappearance of the signs and symptoms of denture stomatitis. [8] Moreover, these medications can produce microbial resistance. [4,8,9] It is advisable to use unconventional schemes for the management of these microorganisms, together with mouthwashes such as chlorhexidine and hydrogen peroxide. [4]

PDT represents another anticipated option that enhanced the outcomes in both experimental [13,15-20] and clinical researches. [12] PDT mechanism of action differs from that of the antifungals. PDT causes protein inactivation and lysis of the cell membrane ending with cell damage [21,22] while antifungals reduce the ergosterol synthesis which is the main sterol in the fungi membranes. [2] PDT encourage cell wall and membrane damage, allowing access of photosensitizer into the cell leading to photo damage to inner organelles and cell death.[20,21].

The finding of this study revealed that there was a 50% decrease in the PDT group in comparison to the superior results in the Miconazole group (85%). In addition, reappearance of denture stomatitis was observed in only 15% in the miconazole group while it was 30% in the PDT group. These results were in accordance with that of the clinical researches of Mima et al [12] and Ribeiro et al. [13].

Denture stomatitis patients may complain from pain, discomfort, objectionable taste and burning sensation related to the inflamed palatal mucosa. [4] There were significant decrease in pain and burning sensation was realized with both treatment groups: 75% of Group I patients (PDT and LLLT) and 90% of Group II.

One of the causes of halitosis is Oral Candida. [24] The results of this study showed that both treatments protocols

produced the same clinical enhancement for halitosis (65%).

5. Conclusion

Photodynamic therapy associated with low level laser therapy (LLLT) and Miconazole gel can be considered effective methods in the treatment of Candida-induced denture stomatitis with higher curing rate and lower recurrence ratio for Miconazole gel.

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