Effect of *Cocos nucifera* Oil in the Management of Post-denture Insertion Mucosal Changes: A Cross-sectional Survey

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**Abstract**

**Aim:** This study aims to find the data related to the use of *Cocos nucifera* oil for the management of post-denture insertion-related mucosal changes in removable denture wearers.

**Materials and methods:** A total of 252 partial and complete removable denture wearers participated in the study formed the study group. A specially designed questionnaire consisting of 15 closed-ended questions was used for data collection on various aspects on usage. Statistical analysis was done using SPSS software version 21.0.

**Results:** Approximately 97.5% of the population seek remedies for denture sores or ulcers, 95.5% prefer *C. nucifera* oil applications and 93.5% of them have experienced relief after the application of *C. nucifera* oil.

**Conclusion:** *C. nucifera* oil is an effective and a safe remedy for post-denture-related mucosal changes by the patients wearing removable dentures.

**Clinical significance:** Removable denture-induced mucosal changes were due to accumulated denture plaque, reactions to the denture base material constituents, and also due to mechanical denture injury. Local and systemic antifungal drug therapy for these post-denture insertion mucosal changes shows lower patient compliance, resistant to the drug, and threat owing to their toxicity.

**Keywords:** Coconut oil, *Cocos nucifera* oil, Cross-sectional survey, Denture sores, Home remedies, Removable denture wearers.

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**Introduction**

The acute and chronic reactions of wearing removable dentures cause lesions in the oral mucosa that are associated with microbial dental plaque which is a reaction to components that makes the denture base material and it can be due to mechanical denture injury. Most denture-related lesions are due to *Candida albicans* or due to mechanical injury, whereas it is unusual to get allergenic reactions to the denture base materials. The antifungals used in the treatment of denture-induced stomatitis include miconazole, fluconazole, itraconazole, nystatin, amphotericin B, ketoconazole, and clotrimazole. Miconazole gel 2% and fluconazole 50 mg/day for 14 days taken orally for denture stomatitis showed good prognosis. Multiple daily doses of local and systemic antifungal therapy show lower patient compliance, resistance to the drug and threat to patients with immunodeficiency, diabetes, and HIV when used for longer time owing to their toxicity and side effects.

Coconut (*Cocos nucifera*) products hold a specific and respectable place in Indian medicine for more than thousands of years. It has anti-blennorrhagic, antibronchitis, anti-gingivitic, and anti-febrifugal properties. In Ayurveda, coconut oil, milk, cream, and coconut water were effective in treating hair loss problems, burns, and heart problems. This was documented in Sanskrit in Ayurveda 4000 years ago. Saponification index in *C. nucifera* oil is high. Lauric acid present in coconut reacts with sodium hydroxide and bicarbonates (alkalis) in saliva to form sodium laureth-soap like substance, which aids in reducing plaque adhesion and accumulation, and also has cleansing action. Antimicrobial and anti-inflammatory properties in lauric acid helps in preventing formation of dental caries and maintains good for oral health.

In addition, it has a pleasant taste. Antimicrobial property of *C. nucifera* oil was effective against *C. albicans* and *Streptococcus* in an *in vitro* biofilm model. Antiseptic properties can be safely used as moisturizer and also as an emollient. *C. nucifera* oil has healing properties and is commonly used for mouth ulcers. As it does have a beneficial effect, it becomes essential to find a suitable cost-effective remedy for the management of acute and chronic

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Cocos nucifera Oil Manages Post-denture Insertion Mucosal Changes

MATERIALS AND METHODS

A descriptive cross-sectional study was carried out among 252 removable denture wearers (both complete and partial denture) attending prosthodontic outpatient department. The research protocol was approved by Dr. M.G.R Educational and Research Institute, Chennai, India (Dr.M.G.R.DU/TMDCH/2019–20/260719002). The questionnaire was divided into two sections with 15 questions in total. The demographic details of participants were collected in the first section, while the second section had questions relating to the use of C. nucifera oil for the management of post-denture insertion mucosal change and numerous factors associated with it. Pilot study with 30 participants from the target population involving mucosal changes involved in patients with removable denture wearers. Hence this cross-sectional study was conducted to evaluate the use of C. nucifera oil for the management of mucosal changes among removable denture wearers.

Table 1: Survey questionnaires

| S. No | Questions | Options | Tick your relevant answers |
|-------|-----------|---------|---------------------------|
| 1.    | Do you use removable dentures? | Yes |  |
|       |                                                      | No |  |
| 2.    | If yes, how long are you using? | 1–2 Years |  |
|       |                                                      | 2–5 Years |  |
|       |                                                      | More than 5 years |  |
| 3.    | What type of removable denture do you use? | Removal partial denture |  |
|       |                                                      | Complete denture |  |
| 4.    | How long do you wear the denture per day? | Less than 5 hours |  |
|       |                                                      | 5–10 hours |  |
|       |                                                      | More than 10 hours |  |
| 5.    | Do you remove the denture during night time? | Yes |  |
|       |                                                      | No |  |
| 6.    | When do you clean your denture? | Everyday |  |
|       |                                                      | Once in 2 days |  |
| 7.    | How do you maintain your denture? | Clear it using water |  |
|       |                                                      | Clean it using identifiers |  |
|       |                                                      | Clean it using denture |  |
| 8.    | Have you experienced oral ulcers before? | Yes |  |
|       |                                                      | No |  |
| 9.    | What would you do? | Visit the dentist immediately |  |
|       |                                                      | Seek home remedies |  |
| 10.   | What are the home remedies you do? | Apply coconut oil |  |
|       |                                                      | Swish with salt water |  |
| 11.   | If you apply coconut oil, how many times a day you apply? | Once a day |  |
|       |                                                      | Two to three times a day |  |
|       |                                                      | More than three times a day |  |
| 12.   | Have you experienced relief after applying coconut oil? | Yes |  |
|       |                                                      | No |  |
| 13.   | How long does it takes to heal the ulcer? | 1–2 days |  |
|       |                                                      | Less than a week |  |
|       |                                                      | More than a week |  |
| 14.   | Have you experienced recurrence of the ulcer after applying the oil? | Yes |  |
|       |                                                      | No |  |
| 15.   | If yes, how often? | 1–2 weeks after healing |  |
|       |                                                      | Less than 1 month after healing |  |
|       |                                                      | More than 1–2 months |  |
was conducted for validating the questionnaire and to get the required sample size. The questionnaire has Cronbach alpha value of 0.7 with adequate internal consistency. Test-retest method was used to assess the reproducibility of the tool. The content validity of the questionnaire was done by a panel of experts who assessed the items in the tool that adequately measure what it is intended to measure and are satisfactory in measuring the field of interest. Examiners were trained and calibration were done in the Department of Prosthodontics. The study samples were randomly selected who were willing to participate in the study. Inclusion criteria for this study included patients wearing a removable denture either complete or partial denture for more than a period of 1 year and above, without any systemic illness and not on any antifungal agent for the management of their denture-related lesions. Denture wearers with less than a year period, systemic illness, and on any antifungal treatment were excluded from the study. After obtaining informed consent, the investigator distributed the questionnaire and to avoid any uncertainty, all the questions were clarified. The respondents were assured of the confidentiality and asked to provide appropriate answer. The analysis of data was done with Statistical Package for Social Sciences, IBM Corporation, SPSS Inc., Chicago, IL, USA version 21.0 software package (SPSS). Descriptive statistics with percentage, frequency, mean, and standard deviation were calculated for various clinical parameters Table 1.

**Results**

Out of the 252 participants involved in the study, the age distribution, which ranges from 30 to 80 years and gender prevalence are shown in Figures 1 and 2, respectively. Distribution of subjects according to the type of denture as in removable partial denture and complete denture, number of years of usage of the prosthesis, and its duration of wear of the prosthesis in a day is elucidated in Table 2.

Out of total participants, 87% of the population removes the denture at night, whereas 13% of the population wears the denture at night.

Regarding the maintenance of the denture, 77% clean their denture everyday and 23% clean their denture once in 2 days, of which 59% clean the denture using water, 34% clean using dentifrices, and 7% clean using denture cleaning kit. About 89% of the study population have experienced denture sores or ulcers and 11% of the population have not experienced ulcers. About 97.5% of the population seek remedies for denture sores or ulcers and 2.5% visits the dentist for the management of ulcers. Among the population who seek remedies for management, 95.5% prefer *C. nucifera* oil applications and 2% prefer salt water gargling and 2.5% preferred honey and turmeric together combined as management for denture sores. Among the preferred *C. nucifera* oil application, the application frequency of once a day, one to two times a day, and more than three times a day and its recurrence rate post-application are mentioned in Table 3, 95.5% of them have experienced greater relief after the application and 4.5% of them have experienced comparatively lesser relief after application. The healing period of ulcers varies such as 2 to 3 days for 65.5% of the population, less

| Type of denture | Frequency | Percentage (%) |
|-----------------|-----------|----------------|
| Removable – partial | 146 | 57.9 |
| Complete | 106 | 42.1 |
| Denture usage | | |
| 1–2 years | 115 | 45.6 |
| 2–5 years | 107 | 42.5 |
| More than 5 years | 30 | 11.9 |
| Duration of wear | | |
| Less than 5 hours | 42 | 16.7 |
| 5–10 hours | 136 | 54.0 |
| More than 10 hours | 74 | 29.4 |

| Table 3: Frequency of *Cocos nucifera* oil application and recurrence rate of ulcers after usage of it |
|--------------------------------------------------|
| Frequency of application | Frequency | Percentage (%) |
|--------------------------|-----------|----------------|
| Once a day | 38 | 15 |
| 1–2 times | 136 | 54 |
| More than 3 times | 78 | 31 |
| Recurrence rate | | |
| Recurrence of ulcers | 46 | 18.29 |
| Nonrecurrence of ulcers | 206 | 81.70 |
than a week for 22.75% and more than a week for 11.75% of the population. Among the population who experienced recurrence of ulcers, 6.89% had recurrence 1 to 2 weeks after healing, 10.34% within a month after healing, and 82.75% more than 1 to 2 months after healing. Many patients (93.5%) reported beneficial results on using C. nucifera oil on a long run in maintaining the oral health of their tissues. Use of these home remedies give them confidence in wearing their dentures on a longer term without changing their dentures and reducing the number of visits to their dentist.

**DISCUSSION**

The study represents more number of male populations due to their working nature and who were willing for replacement when compared to females. The removable denture wearers were higher when compared to complete denture wearers who were more of middle-aged population. This is because of the recent trends of practicing restorative procedures to save the damaged teeth and only severely damaged tooth were indicated for extraction followed by its replacement at their early stage of life. More number of population wore denture for a period of 1 to 2 years in our study, may expect to show acute tissue changes such as denture sores. Early signs of denture stomatitis may be expected in people who are using dentures for 2 to 5 years and more than 5 years, chronic changes associated with denture stomatitis were expected. People in our study who wear dentures at night were more susceptible to abrasive reaction of soft tissues. This may be due to lack of proper postoperative instructions given to the denture wearers during their first visit or either the instructions are not been followed by them. People who clean their dentures everyday are less prone to oral ulcers than people who clean their dentures once in 2 days. Poor maintenance leads to accumulation of food debris causing growth of microbial flora causing irritation to the denture-bearing tissues. Also population which were using cleaning kit to clean their dentures when compared to water and dentifrices shows less susceptibility to soft tissue damage. The soft tissue damage was presented as denture sores/ulcers, most commonly due to mechanical irritation, occlusion imbalance, overextension of dentures, and poor oral hygiene. An experimental research reported that use of topical clotrimazole showed improvement in soft tissues but reoccurred after drug suspension. An experimental research on systemic fluconazole 50 mg and amphotericin lozenges and cream showed recurrence of the denture sores. A research by Koray et al. showed side effects on using hexidine mouth rinses. Topical ketoconazole 2% in orabase shows efficacy as same as ketoconazole tablet but side effects were less. Ketoconazole shows side effects on longer duration such as nausea, vomiting, abdominal pain, constipation, and also showed hepatitis, elevation of liver serum enzymes, purities, etc. Denture sores are extremely painful and most of the population seeks home remedy for immediate relief. The common home remedies include coconut oil, salt water gargling, and honey with turmeric, in which people preferred coconut oil as it is easily available, nonirritant, and cost effective. It is believed that C. nucifera oil has better healing property and most commonly used as antiseptic and antimicrobial agent in Ayurveda. People who applied C. nucifera oil more than thrice in a day shows great relief when compared to the population who applied it for once a day. The time of application also played a major role in healing of the denture sores. People applied C. nucifera oil before food to relieve pain and irritation and people who applied after food showed better healing as more time was available for the C. nucifera oil to react with the tissues. After application of coconut oil, more than 50% of population had experienced healing in 2 to 3 days. Recurrence of dental sores is very less in people who used coconut oil and took longer time say 1 to 2 months to reoccurs. C. nucifera oil promotes epithelization, connective tissue formation which proves it has better regeneration power. Approximately 93.5% patients reported beneficial results on using C. nucifera oil on a long run in maintaining the oral health of their tissues. Use of home remedies give them confidence in wearing their dentures on a longer term without changing their dentures and reducing the number of visits to their dentist.

The uniqueness of the study would be that removable dentures wearers had lesions in the oral mucosa which includes traumatic ulcers, denture stomatitis, angular cheilitis, and denture irritation hyperplasia, were currently managed with conventional medications which do have a systemic consequences and professional help to manage these symptoms. Various remedies play an important role in managing the day-to-day needs of a patient wearing removable dentures which till date had not been high lightened. No studies have been done previously to evaluate and document the use of these home remedies used for the tissue changes associated with long-term denture wearing. This cross-sectional study data would help clinicians to do further research on these home remedies and their healing properties that can be considered for management of denture-related lesions.

**CONCLUSION**

The use of C. nucifera oil for denture sores or ulcer as a remedy has been 93.5% effective in healing of the denture sores and also served as a medium for prevention of recurrence of denture sores. Thus C. nucifera oil is an effective, quick, and a safe remedy for denture sores.

**CLINICAL SIGNIFICANCE**

Removable denture-induced mucosal changes were due to accumulated denture plaque, reactions to the constituents present in denture base, or due to mechanical injury by the denture. C. nucifera oil has antimicrobial activity and has proven to be effective and exhibits maximum potential in an in vitro biofilm model against Candida albicans and Streptococcus mutans.

**ETHICAL APPROVAL**

The research protocol was approved by Dr. M.G.R Educational and Research Institute, Chennai, India (Dr.M.G.R.DU/TMDCH/2019–20/260719002).

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