

# Denture adhesives – their stand in prosthodontics

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Denture adhesives are used by an endless number of denture wearers and also by the dentists who fabricate them. Even then, Prosthodontists have a negative attitude towards the use of denture adhesives and assume that to advocate their use is a means of compensating deficiencies in clinical and technical procedures. Denture adhesives increase denture retention and thereby improve chewing ability, reduce denture wobble, improve comfort and confidence, and reduce amount of food particles collecting under the dentures. Moreover, adhesives undoubtedly provide the patients an increased sense of security and satisfaction, but they should use denture adhesives only on the advice of their dentists. Patients should also be instructed about the proper use and cautioned against misuse of denture adhesives, as a part of denture post delivery instructions.

**Key words:**

The use of denture adhesives dates back to the late eighteenth century, but they were first mentioned in dental literature in the nineteenth century. Earlier, adhesives were formulated by mixing vegetable gums, which absorbed moisture from the saliva and swelled to a mucilaginous substrate that adhered to the mucosa of the mouth and the denture.

In 1967, Kapur<sup>[1]</sup> conducted a study on 26 denture wearers and devised a method for scoring denture retention and stability. He concluded that denture adhesives increased denture retention, thereby improving denture wearer's incisive ability.

Stafford and Russell,<sup>[2]</sup> using radiotelemetry, measured the change in pressure, at the denture-base mucosa interface with and without adhesives and found that the denture adhesives allowed total occlusal greater pressure.

Tarbet et al.<sup>[3]</sup> addressed the role of adhesives in denture retention and stability, and found that the patient perceived improved chewing ability, confidence and comfort, reduced wobble and collection of food particles under denture.

Chew et al.<sup>[4]</sup> used a Kinseographic technique to determine the effectiveness of denture adhesives in improving the retention and stability of the complete maxillary denture *in vivo*.

Abdelmelak and Michael<sup>[5]</sup> suggested that the denture adhesives act as a cushion under complete denture;

reducing the transmission of pressure and friction to the underlying mucosa.

## COMPOSITION

The major constituents of denture adhesives can be broadly divided into three groups.<sup>[6]</sup>

### Group 1

Materials responsible for adhesive properties such as: Karaya gum, tragacanth, acacia, pectin, gelatin, methyl-cellulose, hydroxyl-methyl cellulose, sodium carboxy-methyl cellulose and synthetic polymers (polyethylene oxide, acrylamides, acetic and polyvinyl).

### Group 2

Antimicrobial agents such as hexachlorophene, sodium borate, sodium tetraborate and ethanol.

### Group 3

Additives, Plasticizers, wetting agents and flavoring agents such as oil of wintergreen, oil of peppermint, etc.

## Mechanism of action of denture adhesives

Denture adhesives are marketed as paste, powder or cream. Adhesive powder include vegetable gums such as acacia, tragacanth or Karaya, etc., which swells to



many times their original volume on the addition of water and acquire viscous and retention properties. As water is absorbed by the adhesive agents, the resulting anions are attracted to cations in the mucous membrane proteins, producing the stickiness. Saliva increases the viscosity of the adhesive, thereby increasing the force required to separate the prosthesis from the oral mucosa.

Modern adhesives increase their force by using materials that provide strong bio-adhesive and cohesive forces. Adhesives provide bio-adhesion via carboxyl groups. As the adhesives such as methyl cellulose, hydroxymethyl-cellulose, sodium carboxy-methyl cellulose or polymethyl vinyl-ethermaleicanhydride (PVM-MA), etc., hydrates, free carboxyl groups form electrovalent bonds that produce stickiness. However, the cream adhesives when applied, spread laterally excluding air and saliva from the tissue surface of the denture. The increase in viscosity of the cream layer, compared with that of saliva is a factor for the increased retention<sup>[8]</sup>.

#### Characteristics of an ideal denture adhesive<sup>[9]</sup>

1. Physically it should be in a powder, cream, or a gel form.
2. An ideal denture adhesive should be nontoxic, nonirritant, and biocompatible with the oral mucosa.
3. It should be odorless and tasteless.
4. Should be easy to apply and to remove from the tissue surface of the denture.
5. Should not promote microbial growth.
6. Should retain its adhesive properties for 12–16 h.
7. Should provide comfort, retention and stability to the denture, ensuring the patients ability to function with security and effectiveness during speech, mastication and other functions.

How to use denture adhesives

#### The correct application of denture adhesives is as follows:

1. The tissue-bearing surface of the denture should be cleaned of any residual adhesive.
2. The denture bearing tissues are wiped clean of any denture adhesive, mucous, saliva, or food debris.
3. Apply small quantities of denture adhesive to the tissue-bearing surface of dentures.
  - Wet denture before application.
  - Apply the adhesive to the anterior alveolar ridge, and to the center of hard palate and posterior palate and seal the region of maxillary denture.
  - For mandibular denture, apply the adhesive to the sulcus of denture over the crest of the ridge extending from the anterior region sulcus to the distal extension.
4. Seat denture and hold it firmly by hand pressure for 5–10 s.

- Remove excessive adhesive, extruding from the denture by gauge.
- Instruct the patient to close jaw into centric occlusion several times to distribute the adhesive in an even thin layer between the mucosa and the denture base.

The patient learns by experience to apply the adhesive in an amount that ensures a uniform thin layer with minimum extrusion and sufficient enough for retention.

#### Indications of denture adhesives

Stabilization of trial denture bases during jaw relation records

Jaw relation records registration essentially requires stabilized trial denture bases. Trial denture bases fabricated from base plate, autopolymerizing acrylic resin, etc., do not demonstrate adequate retention and stability. The use of denture adhesive can stabilize the trial denture bases for jaw relation records.

#### During final try-in

Unstable and nonretentive denture bases will make the verification of jaw records difficult or inaccurate. The assessment of the arrangement of teeth arch form, plane of occlusion, smile line, etc., will be compromised. Use of adhesives will improve the accuracy of the denture try in, and also allay the patient's apprehension about the fit of the final processed dentures.

#### Insertion of dentures

Patients with compromised denture-bearing areas can be benefited with the use of denture adhesives because it adds to their confidence and also increases their ability to adapt to new denture.

#### Immediate dentures

Immediate dentures soon become loose due to soft tissue healing and bony resorption advocating to its relining, rebasing, or to a new denture fabrication. During this interim period, a soft liner can be used to augment the retention, comfort and function a denture adhesive may be indicated.

#### Reduction of tissue irritation

Studies indicate that the use of denture adhesives reduced clinical findings of tissue irritation, compression ulcers, and inflammation of the oral mucosa of denture wearers. Denture adhesives are recommended for patients with extremely sensitive oral mucosa and for patients who are denture wearers. Denture adhesives are recommended for patients with extremely sensitive oral mucosa because they aid in denture retention and alleviate the discomfort of tissue irritation.

#### Patients with systemic diseases

Denture patients having dryness of mouth either due

to drug therapy or radiotherapy can be benefited with the use of denture adhesives. Patients using dentures experiencing hormonal changes and disorders in which muscle control is affected such as myasthenia gravis, Parkinson's and Alzheimer's disease, etc., may stabilize their dentures with denture adhesives.

### **Maxillofacial surgery patients**

Patients who are edentulous with gross maxillofacial defects require the use of denture adhesives to retain large prosthesis.

### **Administration of drug therapy**

Denture adhesives are valuable adjunct to the retention of prosthesis designed for the administration of drug therapy and for prosthesis designed as radiation carriers or radiation protection prosthesis.

### **For extra security of stable denture**

Denture patients who are attorneys, executives, speakers, etc., while socializing in public use denture adhesives for the extra security of a retention denture. The use of minimal amounts of denture adhesive provides them psychological security.

### **Contraindication of denture adhesives**

- 1 Patients allergic to denture adhesives or components of adhesives preclude its use.
- 2 Dentures those are grossly inadequate in fit and function.
- 3 Dentures that demonstrate excessive loss of vertical dimension because of bone resorption and soft tissue shrinkage.
- 4 Patients with broken dentures or dentures with missing flange or with sectional fracture should not use denture adhesives to retain their denture.
- 5 Patients who use denture adhesive without thoroughly cleaning the previously used adhesive resulting in a lining of a layered, caked deposit of hardened adhesive should be instructed about the proper method of cleaning the adhesive from the

denture, or should be discouraged from further use of denture adhesive.

### **CONCLUSION**

Denture adhesives, when used properly are safe and beneficial to the patient in improving retention and stability, incisive ability, comfort, function, and in providing psychological security. Although adhesives enhance denture performance and patient confidence, they should not be used to compensate denture deficiencies. The patients should use denture adhesives only on the advice of their dentists and the dentists too should instruct them about the proper use and caution against misuse of denture adhesive.

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