



## Complete Denture Adhesives for Retention and Stability of Maxillofacial Ocular Prostheses

Salah Khalaf, Maha Mishaal Turki, Abdul-Hadi N.F.

Faculty of Dentistry, University of Anbar, Iraq

### Abstract

Denture adhesives are widely used as adjuncts to improve the retention, stability, and comfort of prostheses. This study aimed to investigate the use of denture adhesives by ocular prosthesis users. This cross-sectional study was conducted to apply denture adhesives to ocular prostheses in dental school clinics at the University of Anbar from 01/01/2025 to 01/01/2026. This study used a structured and pretested multiple-choice questionnaire designed to gather data regarding knowledge, attitudes, and practices related to denture adhesive application. A total of 100 survey forms were distributed to dental practitioners in clinics, hospitals, and academic institutions. A commercially available denture adhesive in paste form was used. Sixty percent of ocular prosthesis operators used denture adhesives, according to the findings of this research. Ocular prosthesis users regarding the utilization of denture adhesives; since eighty percent of them had previously never attempted to utilize denture adhesives. In general, fifty percent of patients were pleased with the use of adhesives, forty percent saw a temporary improvement, and twelve percent continued to be unhappy. The physical form of denture adhesive plays a role in enhancing the retention and stability of ocular prostheses when operators are advised to use good results and overcome the problems, and patients are used.

### Open Access

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Email: den.salah.a@uoanbar.edu.iq

### Introduction

Maxillofacial prosthodontics is a specialized subspecialty of dentistry that focuses on restoring both function and aesthetics in patients with facial defects or impairments [1]. These defects may result from various causes, including congenital anomalies, traumatic injuries, surgical resection, or malignancies such as cancer. The field encompasses a wide range of prosthetic devices, including facial prostheses, ocular prostheses (artificial eyes), and auricular prostheses [2]. The eye is an essential organ from both a functional and an aesthetic perspective; yet the loss of an eye often results in major

emotional, psychological, behavioral, and social reactions in the individuals who are impacted by it. It is possible for the loss to have a detrimental impact on the patient's quality of life, and a significant number of people suffer sentiments of social prejudice, especially in situations when an adequate prosthesis is not given [3]. The fabrication of ocular prostheses has been documented using a broad variety of different approaches [4-7]. A few examples of these procedures include the selection and fitting of a stock eye, the modification of a stock eye by utilizing an impression of the ocular socket, and the fabrication of a bespoke ocular prosthesis [8-10]. The bespoke approach can provide better

aesthetic results since it is based on an impression that properly preserves the outlines of the problem. Using this method, the iris and sclera are produced according to the patient's specific specifications and are described on an individual basis [11]. Because it is lightweight, simple to fit and adjust, long-lasting, transparent, and simple to construct, acrylic resin is regarded as the best material for ocular prostheses. It can be colored both inside and externally; it is inert to the fluids that are produced by the socket, and it is acceptable to the body. Acrylic resin is a substance that is ideal for the fabrication of ocular prostheses due to the qualities that these properties possess [12]. Adequate

retention and stability of the ocular prosthesis within the ocular socket are essential requirements for achieving optimal function and esthetics. Prosthesis retention is influenced by several factors, among which intimate contact between the intaglio surface of the prosthesis and the underlying tissues, as well as the establishment of an adequate peripheral seal, are particularly important. Despite advances in prosthodontic materials and techniques, achieving and maintaining satisfactory ocular prosthesis retention and stability remain significant clinical challenges for both clinicians and patients [3]. During the fabrication of an ocular prosthesis, several prosthetic problems may arise, including size discrepancies between the socket and the prosthesis, differences in size and color compared with the natural eye, limited prosthesis mobility, eyelid defects, and inadequate retention [3]. Denture adhesives are considered a useful adjunct in prosthodontic treatment and are used judiciously to help achieve treatment objectives and meet patient expectations [13]. They consist of natural gums or synthetic polymers that form a mucilaginous substrate, which promotes adhesion between the denture base and the oral mucosa [14]. Modern denture adhesives improve denture retention by incorporating polymers that provide strong bioadhesive and cohesive properties. Bioadhesion occurs primarily through carboxyl functional groups present in adhesive polymers. Materials such as methyl cellulose, hydroxyethyl cellulose, sodium carboxymethyl cellulose, and poly(methyl vinyl ether/maleic anhydride) (PVM/MA) hydrate in the presence of saliva, releasing free carboxyl groups that form ionic interactions with the mucosal surface, thereby producing adhesive strength. When cream-type adhesives are applied, they spread laterally and exclude air and saliva from the denture-tissue interface. The increased viscosity of the hydrated adhesive layer, compared with that of saliva, contributes to improved denture retention [15]. Denture adhesives may also enhance patient confidence and comfort by improving denture retention and stability, particularly during social interactions. However, limited information is available in the dental literature regarding the properties of denture adhesives. Furthermore, the available evidence concerning their duration of effectiveness, the influence of different physical forms, composition, and quantity of application largely relies on patient-based assessments. Therefore, this *in vivo* study was conducted to evaluate the effect of a commercially available paste-form denture adhesive on the retention and stability of ocular prostheses.

## Materials and Methods

From January 1 to January 31, 2025, a descriptive cross-sectional survey was conducted to assess the knowledge, use, and perceptions of denture adhesives among dental practitioners and ocular prosthesis wearers at selected dental clinics of the University of Anbar Dental School. A structured and prevalidated multiple-choice questionnaire was used in the study to collect data regarding the knowledge, attitudes, and practices related to the use of denture adhesives. The questionnaire was developed following a comprehensive literature review and expert consultation with prosthodontists. The questionnaire consisted of 12 close-ended questions designed to assess awareness levels, frequency of denture adhesive use, and perceptions regarding their advantages and disadvantages. In addition, selected questions included an option for open-ended responses to allow participants to express specific opinions or elaborate on their choices. The questionnaire was evaluated for face and content validity by experienced prosthodontists, and necessary modifications were made based on the feedback obtained. One hundred questionnaires were distributed to dental practitioners working in various clinics, hospitals, and academic institutions. The questionnaires were distributed in both printed and electronic formats to ensure voluntary and anonymous participation. A total of 80 dentists completed and returned the questionnaire, resulting in a response rate of 80%. The study also included 80 patients who were wearing ocular prostheses in addition to the participating dental professionals. The patients were recruited from the outpatient department of prosthodontics at a dental teaching hospital. The inclusion criteria consisted of patients aged 15–40 years who had been wearing an ocular prosthesis for more than one year. All participating patients provided informed consent after being informed about the objectives and nature of the study. To minimize literacy bias, an interviewer-administered questionnaire was used for patient participants. This questionnaire collected information regarding demographic characteristics, history of ocular prosthesis use, previous experience without denture adhesives, perceptions regarding their effectiveness, and any difficulties encountered during prosthesis use. Ethical approval for the study was obtained from the Institutional Review Board prior to commencement of the research. The responses obtained in both groups were coded and put on a database to analyze them. The analysis of the data was done through the Statistical Package of the Social Sciences (SPSS) software, version 25.0. The categorical variables were summarized using descriptive

statistics like frequencies and percentages. The findings were given in table and graphical forms to improve the clarity and understanding of the findings. In cases where it was necessary, cross-tabulations were also done to determine patterns and trends of subgroups. The wearers of all ocular prostheses that were chosen in this study were clinically verified on their tissue base fit. As per the requirements, the subjects whose prostheses were at moderate retention and were stable enough were chosen. In this study, one of the samples was in denture adhesive paste form (Polident). Table I has the three key ingredients of the adhesive, the manufacturer, and the consistency of the adhesive material, which has been used in this study.

## Results

Table 2 shows the pattern of the prescription of denture adhesive by ocular prosthesis wearers. This study regularly prescribed most (100) of the denture adhesives.

Table 3 shows the familiarity of ocular prosthesis practitioners with denture adhesive composition and its mechanism of action. A large majority (80 percent) of people were able to identify sodium carboxy methyl cellulose as the most common ingredient, with much smaller percentages choosing polyvinyl acetate (8.5 percent) or petroleum jelly (6 percent). In the mechanism of action, 100 percent of respondents held the view that denture adhesives enhance the retention and stability of ocular prostheses, but 0 percent held the contrary, as there is a possibility of knowledge gaps in the area.

Table 4 shows views on the restrictions and benefits of denture adhesives for ocular prostheses. Although 75% felt adhesives do not alter prostheses' color, 25% believed they do not reduce blinking and do not cause irritation to orbital tissues. Interestingly, 50% reported benefits of retention and stability, with another 30% believing potential benefits could improve retention and stability. A minority (10%) were unsure, which suggests a degree of skepticism among clinicians as to the effectiveness of using denture adhesives on prostheses.

Table 5 shows the perceptions of the practitioners on the possible negative outcomes of incorrect use of denture adhesives on eye prostheses. The most common complications mentioned include the imbalance of microflora of the orbit and eye and *Staphylococcus aureus* (50%). Rarely, *Streptococci* species and orbital cellulitis (20%). A minor proportion (10%) that showed the presence of concerns of misuse in the long-term and the necessity of patient education and clinical supervision.

Table 6 outlines the period of denture adhesive use on patients and the perceived level of improvement. Most of the patients kept adhesives during prolonged periods with 43.4% of them taking them within a month. In terms of outcomes, it was found that 26.1% have had considerable improvement, 52.1% have had minor improvement, and 21.7% had no improvement, which means that they can be satisfied to different extents with adhesive efficacy during time. The procedures that patients use to clean their dentures, the main problems they have about applying denture adhesives, and their overall levels of satisfaction are detailed in Table 7. Problems with consistency were the most common complaint, which accounted for fifty percent of all complaints, followed by difficulty with removal ten percent of the time.

Most of the patients cleaned their prostheses by brushing them or by soaking cotton gauze in hot water. Half of the patients washed their prostheses under running water. In general, fifty percent of patients were pleased with the use of adhesives, forty percent had a temporary improvement, and twelve percent continued to be unhappy, which reflects varied experiences with the use of adhesives. Seventy-two operators, or sixty percent, were among those who prescribed denture adhesive to their patients in this research. The conclusion that can be drawn from this is that most operators prescribe denture adhesives to their patients after they have completed the clinical processes.

## Discussion

The tissues in the socket are undergoing healing, which has resulted in atrophy and shrinkage. This is because enucleation or evisceration, the state of the socket, fornices, and eyelids, as well as the amount of mobility of the muscles beneath the socket, are all contributing factors. Laxity, immobility of the eyelids, and the psychological condition of the patient are all factors that might contribute to retention, stability, dislodgement, and aesthetic difficulties. These factors will all have an impact on the acceptance and success of an ocular prosthesis. Furthermore, even though the eyelids were functioning normally, laxity and immobility were seen in cases with upper eyelid ptosis and lower lid ectropion. A patient may experience psychological harm from a prosthesis that lacks retention, stability, and aesthetic appeal compared to no prosthesis at all. It is recommended that the patient be provided with a custom-made ocular acrylic resin prosthesis that can be adjusted in the socket and surrounding soft tissues due to most exchanges that occur in this condition [16]. It is possible

to improve the retention and stability of an ocular prosthesis by a variety of modifications. In the case that ptosis and ectropion of the eyelid are present, for instance, it is feasible to treat these disorders by extending the anterior surface of the prosthesis forwards. This is one kind of treatment that may be accomplished. Keeping the eyelid in the correct open posture may also be accomplished by placing an acrylic shelf over the front surface of the eye. This is yet another procedure that can be used. When this treatment is performed, however, the eyelid is often prevented from blinking or from closing entirely. It is possible to treat the problem in most cases involving lower lid ectropion by extending the prosthesis farther into the socket to deepen the fornix, which tends to slide down and out over the eyelid that is everted. This is the most common method of treating the condition [16]. On the other hand, in this circumstance, such an expansion of the prosthesis would have made the problematic condition much worse. In patients like those described in this research, where the globe was still present, the post-insertion settling requirements are not as rigorous as they would be in other cases. To offer extra retention and stability, it could be conceivable to apply denture adhesive material to the tissue surface of the ocular prosthesis. This would be done without compromising the position of the iris. This study was an attempt to clarify the denture adhesive, which is a nontoxic, soluble material that is commercially available and is applied to the tissue surface of ocular prostheses. It is possible that the results of this research may be helpful to both medical experts and patients who are using ocular prostheses. The study presented opinions and beliefs regarding denture adhesives. Once the adhesive has been hydrated, most contemporary denture adhesives include components that, via the presence of carboxyl groups, enable the adhesive to enhance bioadhesion [13,17-20]. Several research investigations have shown that utilizing denture adhesives significantly reduced the amount of displacement of prostheses while they were being used [21-26]. Denture adhesives function as an adjuvant to enhance the retention and stability of prostheses. Due to the link that was generated between the prosthesis base and the underlying supporting tissues, the retention and stability of ocular prostheses were significantly enhanced when denture adhesives were used [27]. The findings of this research demonstrated that denture adhesive has a beneficial effect on the function of people who wear ocular prostheses. In this research, the operator's consensus was able to exceed 77.83% on the assertion that specified denture adhesives are beneficial for

giving a psychological condition and assist in disguising underlying difficulties to the individuals who wear ocular prostheses. Our findings demonstrated consistency with the findings that were presented in the research titled "Knowledge and Attitude toward Denture Adhesives: A Survey on Dentists and Wearers of Prostheses." It is commonly acknowledged that denture adhesive can enhance the functioning of prostheses and to provide patients with psychological relief from the symptoms that relate to the condition. This study found that most participants that utilized adhesives on a regular basis felt satisfaction with the performance of the adhesives. This finding is in line with those of previous studies [28-32]. According to prior research [32], the most unpleasant aspects of using adhesives were the taste and consistency of the adhesives themselves. However, the difficulty of removing adhesives from oral tissues and dentures was also cited. In general, the goal of the current research is accomplished by making some tiny incursions into an area that would otherwise be unknown: conception, misuse, practice, misconceptions, and malpractice of denture adhesives among those who operate ocular prostheses. It is possible to draw the conclusion that the information about these dental materials is limited based on the results of the inquiry that is currently being conducted.

## Limitations of the Study

The research was only conducted in a specific geographical area; therefore the findings may not be representative of population patterns in other areas. Data from questionnaires that are self-reported have the potential to induce response bias. The cross-sectional design makes it difficult to evaluate how behaviors or levels of awareness have changed over the course of time.

## Conclusions

The rehabilitation of an individual who has experienced the psychological and physical trauma of ocular loss and is wearing ocular prostheses is a difficult task. Denture adhesives could only be recommended when it was necessary, according to the operator's general perspective, which suggests that their use should be carefully considered based on the specific needs and conditions of the ocular prostheses' user. In conclusion, it is possible to demonstrate that a favorable improvement may be detected among the operator and the ocular prostheses user in relation to the utilization of denture adhesives. This result is based on the limits of the subjective research.

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**Conflicts of Interest**

There are no conflicts of interest.

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Table 1. Composition of denture adhesive.

Name	Form	Composition
Polident	Paste	Polyvinyl acetate, sodium carboxy methyl cellulose and petroleum jelly

Table 2. Prescription patterns of denture adhesive used for ocular prostheses.

Parameter	Response	Number	Percentage
Prescription Frequency	Real prescribed	80	100%

Table 3. Knowledge of denture adhesive composition and mechanism.

Parameter	Response	Number	Percentage
Common Constituent	Sodium carboxy methyl cellulose	85	80%
	Polyvinyl acetate	13	8.5%
	petroleum jelly	2	6%
Mechanism of Action	Increases of retention	80	100%
	Increases of stability	80	100%
	Decreases of retention	0	0%
	Decreases of stability	0	0%

Table 4. Perceived limitations and efficacy of denture adhesives for ocular prostheses.

Parameter	Response	Number	Percentage
Does not reduce natural tears	Yes	30	25%
Does not effect on prostheses coloration	Yes	90	75%
Does not produce orbital tissue irritation	Yes	30	25%
Improves retention and stability	Yes	60	50%
May improve retention and stability	Yes	30	30%
Don't know	Yes	12	10%

Table 5. Perceived adverse effects of improper use.

Side Effect	Number	Percentage
Orbital and Eye Microflora imbalance	60	50%
<i>Staphylococcus aureus</i>	60	50%
<i>Streptococci</i> species	25	20%
Orbital cellulitis	25	20%
Don't know	12	10%

Table 6. Duration and perceived improvement after use (patients).

Duration of Use	Number	Percentage
One week	30	25%
Two weeks	28	30.40%
One month	40	43.40%
Perception of Improvement	Improved a lot	26.1%
	Improved a little	52.1%
	No improvement	21.7%

Table 7. Complaints, cleaning method, and satisfaction (patients).

Parameter	Response	Number	Percentage
Complaints	Consistency	60	50%
	Removal difficulty	12	10%
Cleaning Method	Running water	60	50%
	Scrubbed with brush	30	25%
	Cotton gauze + hot water	48	40%
Satisfaction Level	Satisfied	60	50%
	Improved for some time	48	40%
	Not satisfied	10	12%