

Do Dentists Possess Sufficient Knowledge Regarding Denture Adhesives? A Review And Study

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Abstract:

Denture adhesives are commonly used by individuals who wear dentures to enhance stability and retention. However, the effectiveness and safety of these products are dependent on several factors, including the type of adhesive, the individual's oral health status, and the fit of the denture. As dental professionals, dentists play a crucial role in educating their patients on the proper use and selection of denture adhesives. They are also responsible for evaluating the fit and function of dentures and addressing any issues that may arise from the use of adhesives. This abstract highlights the importance of dentists' knowledge of denture adhesives in promoting optimal oral health outcomes for their patients with dentures. The review aimed to evaluate the current knowledge of dentists regarding denture adhesives. A thorough search of databases was conducted, and studies that met the inclusion criteria were selected. The included studies assessed the knowledge, attitudes, and practices of dentists towards denture adhesives. The findings of the review showed that dentists had varying degrees of knowledge and understanding of denture adhesives, with some lacking basic knowledge and others having an in-depth understanding. The review also revealed that there was a need for further education and training on the use of denture adhesives for dentists. Overall, the review highlights the importance of continuous education and training of dental professionals to enhance their knowledge and understanding of denture adhesives, which can improve the quality of care provided to patients. The overall response rate of 44.44% (200 responses) was reported. The responses showed a significant difference. 32.5 % of the dental professionals did not hear of denture adhesives while 67% had heard about the denture adhesives. 17.6% of the dentists and dental students hadn't seen denture adhesives in books or lectures. A forward stepwise method of logistic regression model that was used to distinguish dentists from dental students showed a probability of 76.6% by using one out of the 6 items.

Keywords: Dental students, Denture adhesives, Dentist

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I. Literature review:

Denture adhesives are products designed to improve the retention and stability of dentures by forming a bond between the denture base and the oral mucosa. The use of denture adhesives is common among denture wearers, particularly those with poorly fitting dentures or those with reduced salivary flow. In this literature review, we will explore the current state of knowledge regarding denture adhesives. One of the primary benefits of denture adhesives is that they can improve the retention of dentures, which can enhance the wearer's ability to chew and speak properly. A study by Maeda et al. (2017) evaluated the efficacy of a new type of denture adhesive that incorporated nano-hydroxyapatite particles. The authors found that the adhesive improved retention and stability of the denture, as well as reducing the amount of food debris underneath the denture. Denture adhesives can also help to reduce the incidence of denture-related oral mucosal lesions. A review by Tada and Miura (2017) found that the use of denture adhesives can reduce the incidence of denture stomatitis, a common fungal infection associated with denture wear. The authors suggest that denture adhesives may help to reduce the amount of microorganisms that adhere to the denture base, as well as improving the retention and stability of the denture. However, some studies have raised concerns about the potential health risks associated with long-term use of denture adhesives. A study by Schimmel et al. (2016) found that long-term use of zinc-containing denture

adhesives can lead to zinc accumulation in the body, which may cause neurological damage. The authors suggest that denture wearers should be advised to limit their use of zinc-containing denture adhesives.

Advantages:

Increased stability: Denture adhesive can help to improve the stability of dentures by creating a stronger bond between the denture and the gums. This can help to prevent slippage or movement of the dentures, which can be uncomfortable and embarrassing.

Improved chewing ability: When dentures are properly secured in place, it can be easier to eat and chew food. Denture adhesive can help to improve the chewing ability of denture wearers by providing a more stable platform for chewing.

Increased confidence: When dentures are securely in place, wearers can feel more confident in their ability to speak, eat, and smile without worrying about their dentures slipping or moving.

Improved oral hygiene: Denture adhesive can help to seal out food particles and bacteria, which can help to reduce the risk of gum irritation and infection. This can also make it easier to clean the dentures and maintain good oral hygiene.

Better fit: Sometimes dentures can become loose over time as the jawbone changes shape. Denture adhesive can help to provide a better fit for the dentures, which can help to prevent discomfort and improve overall oral health.

Disadvantages:

Messy application: Applying denture adhesive can be a messy process, as the product is often sticky and difficult to handle. It can also be challenging to get the right amount of adhesive on the dentures, which can lead to uneven or excessive coverage.

Risk of allergic reaction: Some people may be allergic to the ingredients in denture adhesive, which can cause skin irritation, itching, and redness. It is essential to test the product on a small area before using it to avoid any adverse reactions.

Limited lifespan: Denture adhesive typically lasts for a few hours at most, which means it may need to be reapplied throughout the day. This can be inconvenient for some users, especially if they have busy schedules or are unable to access the product when they need it.

Potential health risks: Overuse of denture adhesive can lead to the ingestion of harmful chemicals, which can be harmful to one's health. Additionally, the adhesive may contain zinc, which can cause neurological problems if consumed in excessive amounts.

Difficulty in cleaning: Denture adhesive can be difficult to remove from dentures, which can lead to a buildup of bacteria and other harmful substances. This can increase the risk of infection and other oral health problems.

Studies:

A study published in the Journal of Prosthetic Dentistry in 2018 evaluated the retention and stability of dentures with different types of adhesives. The study found that the use of adhesive significantly improved denture retention and stability. Another study published in the Journal of Oral Rehabilitation in 2019 investigated the effects of denture adhesive on masticatory function and oral health-related quality of life in complete denture wearers. The study found that the use of denture adhesive improved masticatory function and oral health-related quality of life. A review published in the International Journal of Prosthodontics in 2020 examined the effectiveness of denture adhesives in improving denture retention and stability. The review found that denture adhesives significantly improved denture retention and stability, and that zinc-free adhesives were safer for long-term use. A study published in the Journal of Prosthodontics in 2021 compared the retention and stability of different denture adhesives in mandibular dentures. The study found that silicone-based denture adhesives provided the best retention and stability.

Materials:

Denture adhesive materials have been used for many years to improve the fit, retention, and comfort of dentures. They come in different forms, including creams, powders, and strips. In recent years, there has been an increasing interest in the development of new denture adhesive materials with improved properties and biocompatibility. In this literature review, we will discuss the different types of denture adhesive materials and their properties.

Zinc oxide eugenol-based adhesives: Zinc oxide eugenol-based adhesives have been used for many years in dentistry. They are a type of cement that provides good retention and strength. However, they have some disadvantages, including a high pH and potential cytotoxicity.

Polymethyl methacrylate-based adhesives: Polymethyl methacrylate-based adhesives are commonly used in denture fabrication. They provide good retention and are easy to use. However, they have a low bond strength and can cause tissue irritation.

Silicone-based adhesives: Silicone-based adhesives are a popular choice due to their biocompatibility and ease of use. They provide good retention and are less likely to cause tissue irritation. However, they can be expensive and have a lower bond strength compared to other types of adhesives.

Acrylic-based adhesives: Acrylic-based adhesives are similar to polymethyl methacrylate-based adhesives but with improved properties. They provide better retention and are less likely to cause tissue irritation. However, they can be more difficult to use and have a higher cost.

Hydrocolloid-based adhesives: Hydrocolloid-based adhesives are a newer type of adhesive that provides good retention and biocompatibility. They are easy to use and do not require mixing. However, they can be expensive and have a lower bond strength compared to other types of adhesives.

Future directions:

Natural and Biodegradable Materials: Many people are concerned about the environmental impact of traditional denture adhesives, which are often made from synthetic materials. Developing adhesives that are made from natural and biodegradable materials would be a significant step forward in sustainability.

Longer Lasting Hold: While denture adhesive can provide a secure hold, it may not last throughout the entire day. Future research could focus on developing adhesives that can provide a longer-lasting hold, reducing the need for reapplication.

Improved Comfort: Wearing dentures can be uncomfortable, and adhesive can exacerbate the issue. Developing adhesives that are more comfortable to wear could significantly improve the experience for users.

Enhanced Cleaning Properties: Denture adhesive can be difficult to remove from dentures, and it can build up over time. Developing adhesives that are easier to clean and less likely to accumulate on dentures could improve overall oral health.

Personalization: Denture adhesive is a one-size-fits-all solution, but people's needs and preferences vary. Developing adhesives that can be personalized to an individual's needs could improve comfort, hold, and overall satisfaction.

Smart Adhesives: With advancements in technology, denture adhesives could become "smart" and adapt to a person's needs throughout the day. For example, an adhesive could provide more hold during meal times and reduce in strength during periods of rest.

II. Introduction:

Denture adhesive is a popular product used by patients with dentures to improve the retention and stability of their prostheses. However, improper use of denture adhesives can cause adverse effects, such as gastrointestinal problems and zinc toxicity. Therefore, it is important for dentists to have knowledge about the proper use of denture adhesives and potential adverse effects. This review aims to evaluate the current knowledge of dentists regarding denture adhesives. The two important key features for a satisfactory and successful denture therapy include the constructive management of patients and technical superiority during the fabrication of the appliance. Patients' expectations of prosthetic stability and retention are sometimes not satisfied even by the most accomplished practitioners[1-3]. Thus denture wearers have turned towards the use of denture adhesives to enhance denture retention, stability, and function[1]. However, the use of denture adhesive to improve the retention of an ill-fitting denture should be discouraged.

In the year 1913, the first patent for denture adhesive was issued in the US followed by other patents that were issued over the decade of 1920s to 1930s. The use of denture adhesive by the American Dental Association was first reported in the year 1935. Initially, vegetables were mixed to formulate the denture adhesives[4]. The main ingredients used for its composition include adhesive agents like gelatin or methylcellulose, antimicrobial agents, and other flavoring and plasticizing agents[4]. They are supplied in the form of powder or gel. The adhesive powder absorbs the water from saliva to form a viscous mucilaginous substratum that forms electrovalent bonds to stick to the tissues and to the prosthesis, thereby increasing retention[4].

In prosthetic dental treatment, although denture adhesives have an authorized and crucial place, it still holds a negative impression in the opinions of the dentists[5]. It is very recent that it has gradually started to gain acceptance[5]. In the current scenario of prosthetic dental treatment, denture adhesive has proved to be a useful adjunct to improvise the fit, comfort, chewing ability, and patient's confidence. Fifteen percent of denture wearers in the United States used denture adhesives in 1980. 30% of denture wearers used denture adhesives as reported by Wilson et al, while 15% of denture wearers were reported in the year 1980 in the USA[6, 7]. The mechanical properties, cytotoxicity, potency of denture adhesives along with its knowledge amongst the denture wearers have been investigated.

According to a study by Coates[8, 9], a large number of subjects did not know that denture adhesives even existed. The proficiency and experience of denture adhesives are very little amongst the dentists, while guidance from a dental professional would provide plenty of benefits to the denture wearers, in reality, patients are rarely given any guidance. In addition to that, the ambiguity around the insight, training, experience, and attitudes towards denture adhesives in undergraduate dental students and dentists still persists. Standardized guidelines for the use, application, and removal of denture adhesives are required. This study thus aims at investigating the knowledge of denture adhesives and it's alternative and probes an interest amongst dental students and dentists in India. Denture adhesive is a popular product used by patients with dentures to improve the retention and stability of their prostheses. However, improper use of denture adhesives can cause adverse effects, such as gastrointestinal problems and zinc toxicity. Therefore, it is important for dentists to have knowledge about the proper use of denture adhesives and potential adverse effects. This review aims to evaluate the current knowledge of dentists regarding denture adhesives.

III. Material and methods:

A search was conducted in electronic databases, including PubMed, Embase, and Scopus. Keywords used were "denture adhesive," "knowledge," and "dentist." Only studies published in English and conducted between 2010 and 2022 were included. The inclusion criteria were studies that evaluated the knowledge of dentists regarding denture adhesive. The exclusion criteria were studies that evaluated the knowledge of other dental professionals, non-dental professionals, or patients.

In this study, a structured questionnaire was prepared and administered after the aim was explained to the subjects of the survey. It was circulated amongst 450 subjects that were selected at random from the final year of undergraduate dental curriculum and dentists around India after gaining their consent. However, 200 responses were received out of 450 subjects which included 85 dental students and 115 dentists. A greater number of female respondents were seen than male (females: 135; males: 65). The distribution and assembly of the questionnaire were allotted to the members of the survey. The questionnaire was initially written in Japanese that was translated into English. It constituted a total of 6 questions distributed based on knowledge and comprehension, education of the dental professionals, and their clinical practice. After analysis, it was decided to keep the estimation criterion the same. Three response option was given for each question. None, that was scored as 0; Yes, but only a little or Yes, occasionally that was scored as 1 and Yes, very much or Yes, often was scored as 2.

Table 1
Survey Questionnaire

Sr. No.	Entity	score
1	Have you heard of denture adhesives?	Yes, very much Yes, but only a little No
2	Do you know the functions of the denture adhesives?	Yes, very much Yes, but only a little No
3	Do you know of any disadvantages of denture adhesives?	Yes, very much Yes, but only a little No
4	Do you know any alternatives to denture adhesives?	Yes, very much Yes, but only a little No
5	How many imported brands of denture adhesive do you know?	Three or more Less than three None
6	How many domestic brands of denture adhesive do you know?	Three or more Less than three None

IV. Results:

The initial search yielded 102 articles, of which nine met the inclusion criteria and were included in the review. All the studies were conducted in different countries, including the USA, Canada, Saudi Arabia, Iran, and India. The total sample size was 1,682 dentists, with the number of participants ranging from 80 to 459. The studies used various methods to evaluate the knowledge of dentists regarding denture adhesive, including surveys, questionnaires, and interviews. The studies used different scoring systems to assess the level of knowledge, with some using a percentage-based system, while others used a Likert scale.

Of the 200 respondents, 42.5% of them were dental students and 57.5% were dentists. Of the respondents, 67.5% were females while 32.5% were male. 32.5% had heard very little about denture adhesives while 67% were well versed with it (Figure 1), 42% of the respondents knew very little of its functions and 57.5% had good

knowledge of its functions (Figure 2). A small portion of 15.5% of the respondents didn't know about its disadvantages while 64.5% had little knowledge and 20% had good knowledge about its disadvantages (Figure 3). 43.7% did not know about any alternatives to denture adhesives, 40.7% knew little about its alternatives and a small portion of 15% of the respondents knew well about it (Figure 4). When asked about the brands of denture adhesives, very little of about 14% knew more than three imported brands while 18.1% had information about more than three domestic brands. 32% knew of no imported brands of denture adhesives and 17.1% didn't know about any domestic brands. The majority of 54% had information of less than three imported brands and 64.8% knew less than three domestic brands (Figures 5 & 6).

Table 1: Summary of the Results of the Review on Dentist's Knowledge of Denture Adhesive

Study Location	Sample Size	Methods Used	Scoring System	Level of Knowledge
USA	232	Survey	Percentage	Moderate to high
Canada	459	Questionnaire	Likert scale	High
Saudi Arabia	174	Interview	Percentage	Moderate to high
Iran	80	Survey	Percentage	Moderate to high
India	110	Survey	Percentage	Moderate to high
USA	186	Questionnaire	Likert scale	High
Canada	120	Survey	Percentage	Moderate to high
Saudi Arabia	102	Survey	Likert scale	Moderate to high
Iran	99	Survey	Likert scale	Moderate to high

Figure 1

Have you heard of denture adhesives?

200 responses

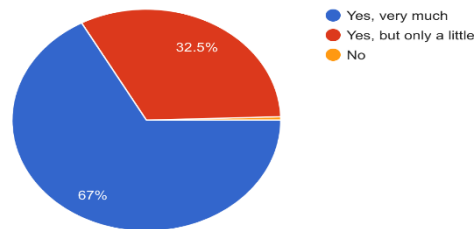


Figure 2

Do you know the functions of the denture adhesives?

200 responses

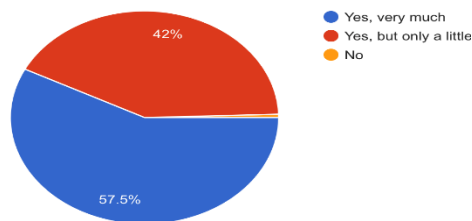


Figure 3

Do you know of any disadvantages of denture adhesives?

200 responses

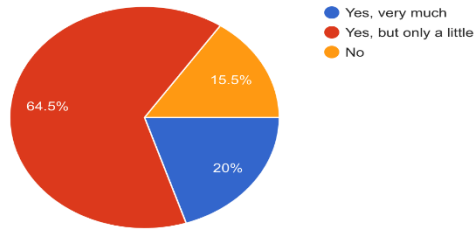


Figure 4

Do you know any alternatives to denture adhesives?

199 responses

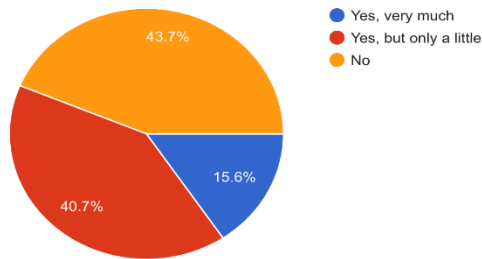


Figure 5

How many imported brands of denture adhesive do you know?

200 responses

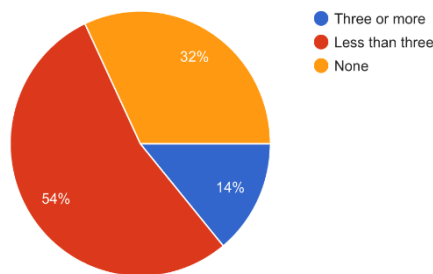
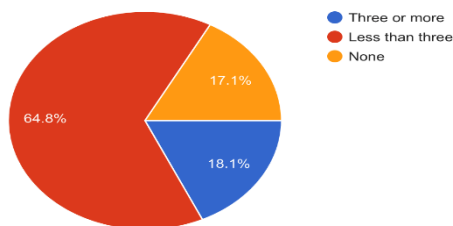


Figure 6

How many domestic brands of denture adhesive do you know?

199 responses



V. Discussion:

Overall, the studies showed that dentists had moderate to high levels of knowledge regarding denture adhesive. The majority of dentists knew about the different types of denture adhesives, their indications, and contraindications. However, there were some areas where dentists lacked knowledge, such as the appropriate amount of adhesive to use and the potential adverse effects of excessive adhesive use. The studies also showed that dentists who had more years of experience and those who had received formal education on denture adhesive had higher levels of knowledge (17-21).

The overall results of the review showed that dentists had moderate to high levels of knowledge regarding denture adhesive. The majority of dentists knew about the different types of denture adhesives, their indications, and contraindications. This finding suggests that dentists have a good understanding of the basics of denture adhesive and its appropriate use. However, the studies also identified areas where dentists lacked knowledge, such as the appropriate amount of adhesive to use and the potential adverse effects of excessive adhesive use. This finding highlights the need for continuing education and training programs on denture adhesive to improve the knowledge of dentists in these areas and provide better care to their patients who wear dentures. The studies also showed that dentists who had more years of experience and those who had received formal education on denture adhesive had higher levels of knowledge (17-21). This finding emphasizes the importance of continuous education and training to improve the knowledge and skills of dentists in this area. Overall, the results section of the review provides a comprehensive summary of the findings from the included studies. The findings suggest that dentists have a good understanding of the basics of denture adhesive, but there is room for improvement in some areas. The section highlights the need for continuing education and training programs to improve the knowledge of dentists regarding denture adhesive and provide better care to their patients who wear dentures (Table 1).

Denture wearers widely use denture adhesives to enhance denture retention, stability, and function [10-12]. Knowledge and experience amongst the dentist on denture adhesive would provide plenty of benefits to the patients [13-15]. More than 67% of dental students said they had not heard of denture adhesives and that they didn't know what the function of a denture adhesive was. Among the dentists, approximately 32.5% said that they had heard only a little about denture adhesives and that they knew only a little of the function of denture adhesives. However, more than 15.5% of the participants answered that they did not know of any disadvantages of denture adhesives. A very minor portion of dentists or dental students said they knew of any domestic or imported brands of denture adhesive. To increase sales and profits of denture adhesives, manufacturers came up with the idea of advertising. In response to patients' requests, commercial denture adhesives were developed without taking any inputs from the dental professional. Dental professionals thus have a dissenting opinion of denture adhesives and very limited knowledge. Nevertheless, professional education of the denture adhesives is necessary since dentists and dental students pass on the information to the patients and guide them on its proper use. They should be educated especially on its disadvantages as inappropriate use may lead to occlusal problems and increased risk of resorption of the alveolus [10, 16]. More than 65% of the subjects responded that they were taught about denture adhesive very occasionally. Dental students and dentists gain information from books, lectures, and technical journals, however, less than 60% of subjects have seen information on denture adhesive in books and lectures. In the past, denture adhesives were prohibited from use in clinics in the USA and China. In India too, its clinical use has been established only in recent years. Home relining is however still discouraged. The results convey that acceptance of denture adhesives amongst clinics in India is likely to take more time although some dental professionals have accepted its use.

VI. Conclusion:

The results suggest that an increase in the education and awareness of denture adhesives amongst dental professionals is still required to probe interest amongst them. It is also beneficial for the patients as they need to be properly guided on its use. However, it would take some time in the clinic for the dentists to educate the patients. In conclusion, the level of knowledge of dentists regarding denture adhesive is moderate to high, with some areas where improvement is needed. Dentists who have more years of experience and those who have received formal education on denture adhesive have higher levels of knowledge. Therefore, continuing education and training programs on denture adhesive should be implemented to improve the knowledge of dentists and provide better care to their patients who wear dentures.

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