

## BENEFITS OF USING ADHESIVES IN CONVENTIONAL COMPLETE DENTURES

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### ABSTRACT

**Aim:** The aim of this study is to test two types of adhesives dedicated to complete dentures as regards the improvement of denture retention, patients' comfort and the interactions between such adhesives and saliva.

**Material and methods:** The study was conducted on 8 bimaxillary completely edentulous patients (with complete denture rehabilitations), divided into two groups. The protocol implied: testing the dentures retention; evaluation of patients' comfort; in vitro evaluation of interactions between these adhesives and saliva. **Results and Discussions:** Dentures' retention improved and increased values of the saliva pH were recorded for both adhesives; discreet variations as regards the taste alterations were noted; buffer capacity, salivary flow and saliva quality did not show significant differences. **Conclusions:** Dental adhesives provide benefits in case of complete dentures with poor retention; patients feel increased comfort without significant taste alteration; adhesives have beneficial impact on salivary pH increase with positive effects on oral health.

**Keywords:** complete denture, denture adhesives, patient comfort

### INTRODUCTION

Complete edentulism is a complex pathology whose treatment has a high degree of difficulty due to local aspects related to severe mandibular and maxillary bone resorption (which generates equilibrium issues) and to the aging process, which can be associated with diverse general pathologies with impact on the oral status.

Overdentures retained by mini-implants [1] or implants, considered today as the first treatment alternative in the complete edentation [2], is often difficult or even impossible to apply as it requires suitable bone support for the insertion of implants and a good general health status. The high treatment costs and elderly patients' reluctance to extensive surgery procedures are additional factors that prevent many

patients from choosing this option, which is why complete denture remains an extremely frequent treatment alternative for the rehabilitation of complete edentation. However, complete dentures often generate biomechanical, balance issues related to retention and stability which, in their turn, cause patients difficulties in mastication and phonation as well as discomfort while wearing the dentures and as regards their social life. In such situations the use of adhesives can offer certain benefits [3,4].

Retention is often difficult to achieve by cause of severe resorption of the edentulous ridge and decrease of the qualitative and quantitative salivary flow – one of the key factors in retaining the complete denture [5]. The presence of saliva provides cohesion and adhesion between the denture internal surface

and the underlying oral tissues, thus improving the denture retention [6, 7, 8]. alteration, whether this is caused by physiological conditions such as aging or by pathological conditions - hypertension, depression, malnutrition, dehydration, diabetes, immune disorders e.g. Sjögren's syndrome [9,10], or by certain medications such as tricyclic antidepressants, sedatives, tranquilizers, antihistamines, antihypertensive agents, cytotoxic agents, antiparkinsonian and anticonvulsant agents [11, 12]. In such cases additional adhesive substances may be used [13]. Thus, many patients dissatisfied with their denture retention used denture adhesives, which are widely advertised as providing significantly increased comfort when wearing complete dentures.

Recent studies show that approximately 15-33% of complete denture wearers use such adhesive substances [14].

Previous literature mentions certain unfavorable aspects of denture wearing - oral mucosal hypersensitivity and inflammation and modifications of the oral flora [15]. However, more recent studies have concluded that adhesives offer important advantages such as improved denture stability, increased retention and resistance to dislocation - that can be measured using gnathometers or gnathometers - and reduced mucosal discomfort. Other advantages include extension of intervals between the required adjustments of the denture by the clinician as well as the decrease of incidence of oral mucosal irritation and ulceration due to the fact that the adhesives act as buffering agents preventing direct contact between denture and oral mucosa [16].

Therefore, the purpose of this study is to evaluate the advantages of using the denture

Saliva often fails fulfilling this role as a consequence of the salivary flow adhesives with regards to three distinct aspects: retention improvement, influence of adhesives on salivary pH and comfort of totally edentulous patients while using them.

## MATERIAL AND METHODS

The tests were conducted on 8 patients with ages of  $70.2 \pm 5.5$  years, of which 4 females and 4 males; they were all bimaxillary completely edentulous, wearing complete dentures realized within the Complete Denture Department, Faculty of Dental Medicine of the University of Medicine and Pharmacy „Carol Davila” Bucharest. The patients were divided into two study groups: patients 1, 3, 5, 7 (first group) and patients 2, 4, 6, 8 (second group). All patients signed the informed consent form. The exclusion criteria regarded patients with complete overdentures, mucosal diseases (e.g. stomatitis, hyperplasia) as well as non-cooperative patients and the ones who regularly use denture adhesives.

### Working protocol

The data collection was carried out between 15<sup>th</sup> April and 15<sup>th</sup> June 2018 using an evaluation form containing the following tick boxes:

**a/Patient's information:** personal data, length of use of the complete denture.

**b/Evaluation of complete denture retention** by applying retention tests before and after applying the adhesives. The retention tests - 3 tests for the upper jaw and 4 tests for the lower jaw - were performed before applying the adhesives in order to evaluate the initial denture retention. The same tests were conducted again 24 hours after the adhesives were applied; their results showed whether or

not the initial retention situation improved and received positive or negative scores.

**c/Comfort.** Following the adhesive application, the patients were asked whether they perceived improved comfort as well as any taste or smell alterations. Patients were asked to evaluate the comfort they perceived while wearing complete dentures using adhesives with scores from 1 to 10.

**d/Saliva analysis** was performed using an in vitro test („*Saliva-Check Buffer*” - GC Corporation Tokyo, Japan), which tested the salivary pH, buffer capacity, salivary flow and salivary viscosity before and 24 hours after applying the adhesive.

Thus, the salivary pH was considered highly acidic when ranging between 5.0-5.8, moderately acidic when its values varied between 6.0-6.6 and normal for values between 6.8-7.8. Saliva buffer capacity was considered very low when ranging between 0-5 points, low between 6-9 points and normal between 10-12 points. The unstimulated saliva is evaluated by visually examining the hydration of the labial mucosa, i.e. by counting the time needed for the labial mucosa rehydration after wiping it with a sterile compress: >60 sec. – low rehydration; < 60 sec. – normal rehydration.

The stimulated salivary flow rates were very low for values below 3.5 ml/5 minutes, low for values ranging between 3.5-5 ml/5 minutes and normal for values over 5 ml/5 minutes. A sticky or bubbly saliva were signs of increased salivary viscosity while a watery saliva indicated normal salivary viscosity.

Two types of adhesives were selected for the study out of the brands sold on the local market: the first one was named "F" and was chosen due to its popularity (the most commonly used in Romania), whose ingredients include Calcium, Zinc, PVM / MA

copolymer, liquid paraffin, cellulose, gum, vaseline, silicium, menthol and peppermint oil; the second one was named "D" and contains sage and chamomile extract - the selection criteria being its natural ingredients, which are very appealing to patients as per the current trend. Adhesive F was applied to the first group of patients and adhesive D to the second one.

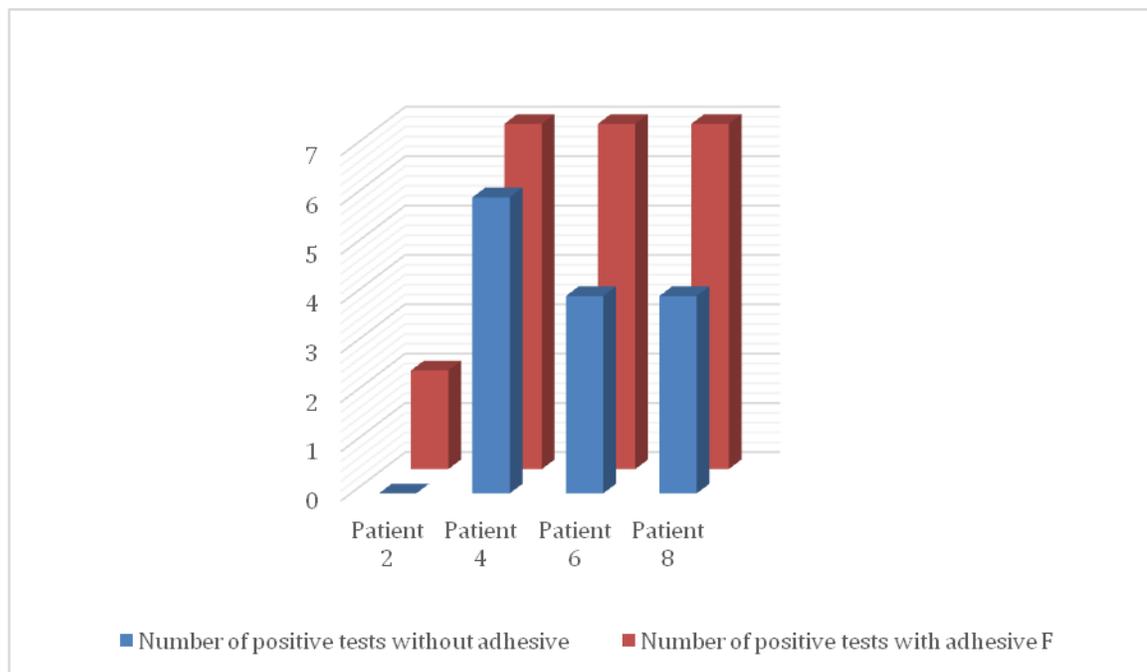
## RESULTS AND DISCUSSIONS

Regarding the retention tests – 80% of the retention tests that had resulted negative prior to applying the adhesives turned positive after their application both for the first and the second group of study while the positive results of the tests remained unchanged [17]. No significant differences as regards retention improvement were noted between the two types of tested adhesives, respectively F and D (Fig.1, Fig.2).

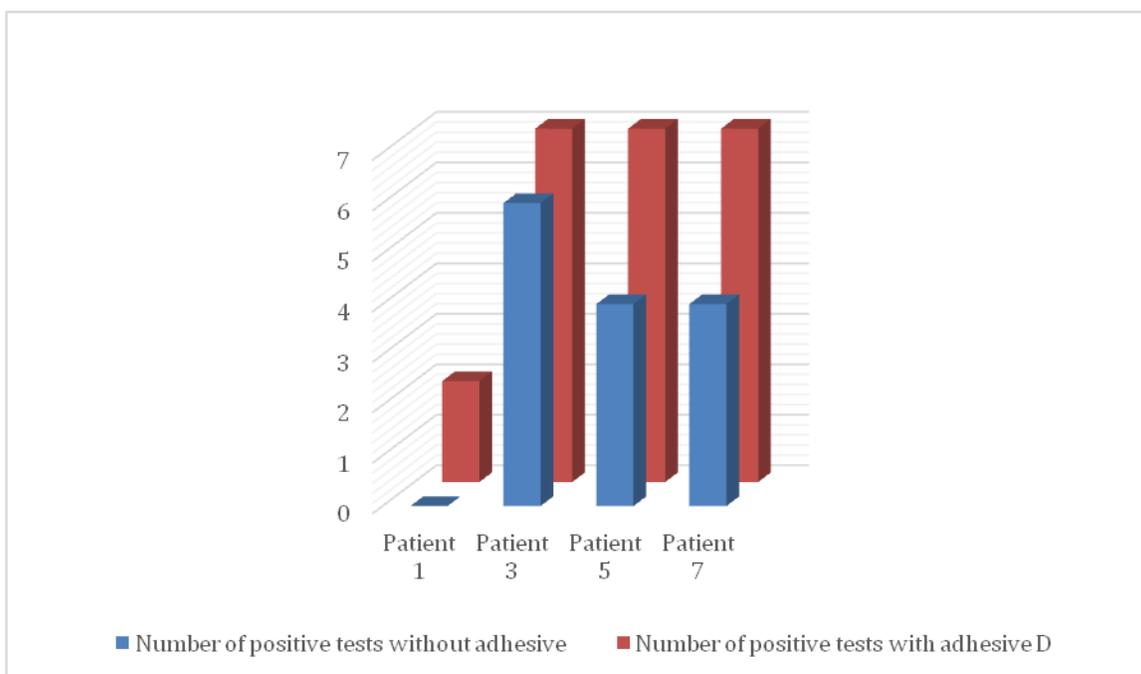
In order to assess the possible negative effects of adhesives on smell and taste alteration generating discomfort, patients were asked to evaluate with a score from 1 to 10 the comfort of wearing dentures after applying adhesives. Patients 1 and 3 who used adhesive D gave lower scores than patients 2 and 4 who used adhesive F [18] (Fig.3).

With regard to the saliva analysis, only the salivary pH increased following the application of denture adhesives, both in case of applying adhesive F and D [19].

From the figures below we conclude that denture adhesives have a beneficial influence on salivary pH (Fig.4, Fig.5), whose peak value was significantly higher (by 0.7p) in case of applying adhesive F. No major changes were noted for the other analyzed saliva parameters (buffer capacity, salivary flow and salivary viscosity).



**Figure 1. Retention improvement with adhesive F**



**Figure 2. Retention improvement with adhesive D**

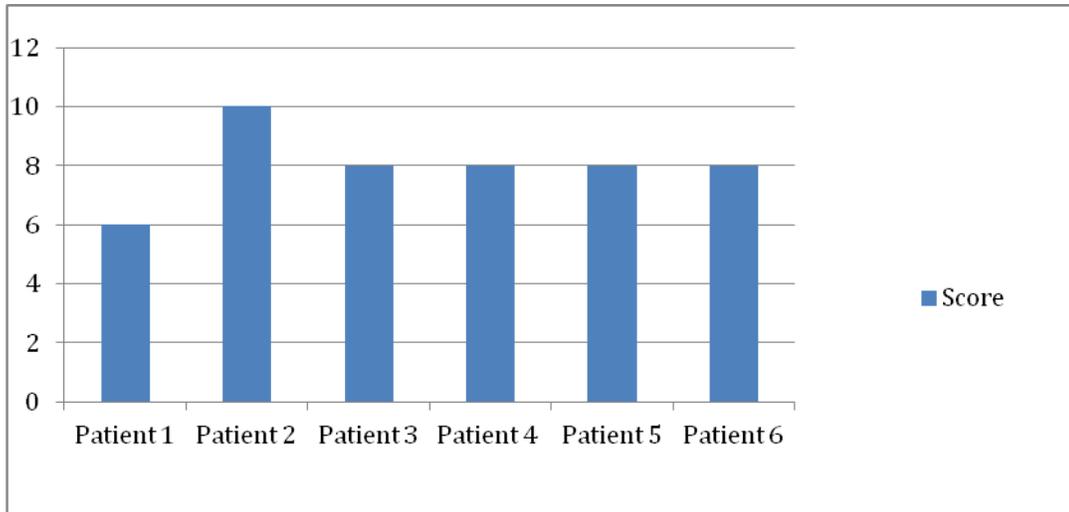


Figure 3. Comfort while wearing dentures after applying the two types of adhesives

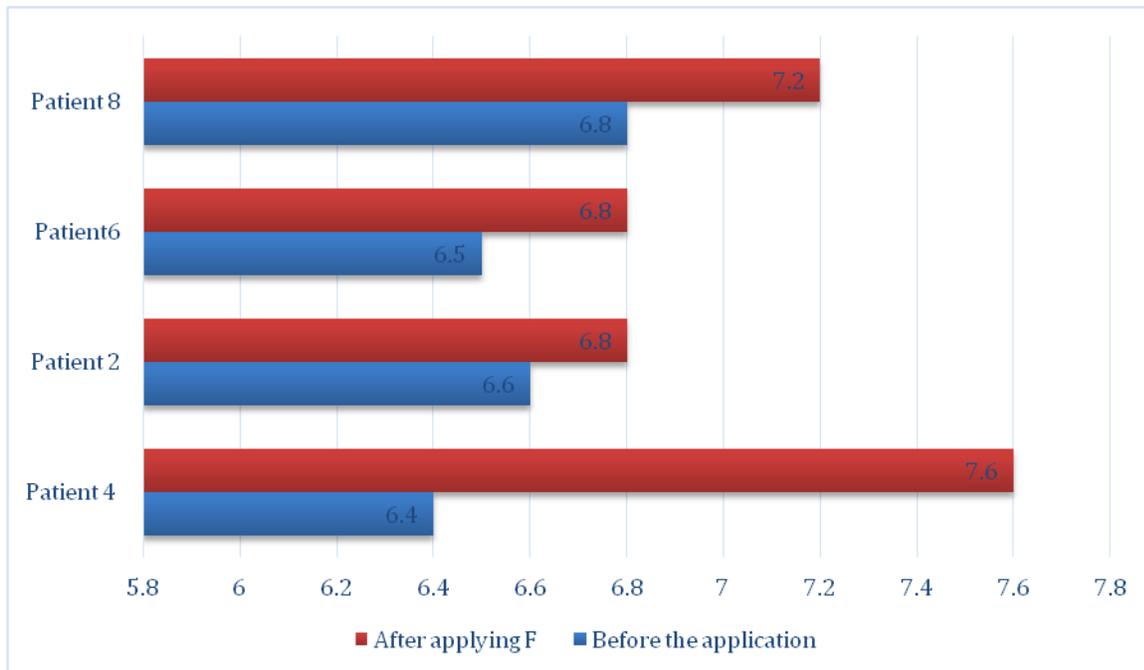
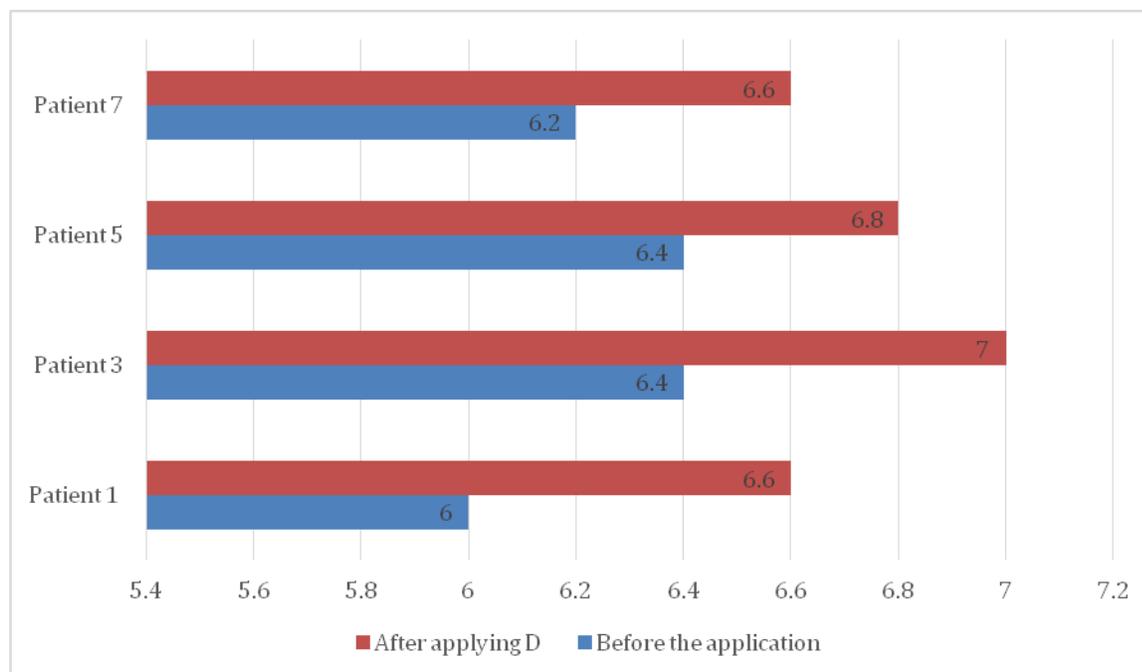


Figure 4. pH growth on patients wearing dentures after applying adhesive F



**Figure 5. pH growth on patients wearing dentures after applying adhesive D**

## CONCLUSIONS

Within the limitations of this study, the following conclusions were drawn:

1. The use of adhesives, regardless of their manufacturer and ingredients, has proven beneficial in the case of complete dentures with deficient retention. Retention improved by using adhesives as the results of the tests changed from negative - before applying the adhesive - to positive, after their application. No notable differences were reported as regards the retention improvement between the two types of adhesives tested during our study [20].
2. The adhesive based on natural extracts of sage and chamomile did not offer patients a superior comfort in terms of smell and taste compared to the classic one and both types of

substances were well tolerated by patients as regards these two aspects.

3. A beneficial influence on the salivary pH was noted both when using adhesive D and in case of using adhesive F, with positive effects for the health of the oral cavity. Their use did not influence the salivary flow, buffer capacity and viscosity of saliva.

4. The use of adhesives requires patients' training on their application as well as on the appropriate denture hygiene. It is therefore important that the dentist be informed on the adhesives properties, indications and advantages so that the patient can benefit from proper medical advice.

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