

## Clinical and Patient Satisfaction Evaluation of an Organic Olive Oil-Based Denture Adhesive Cream, OlivaFix Gold®, in Denture Wearers from 3 European Countries with Different Socio-Economical Characteristics

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### Abstract

Denture adhesive creams, although not entirely endorsed by the dental professional community, are medical devices recognized in international scientific literature as suitable products to improve retention, stability and function of conventional denture wearing. Recently research has reported the potential risks associated with prolonged use of denture adhesive creams. For instance excessive zinc ingestion from the overuse of zinc-containing denture adhesives can cause elevation of serum zinc levels that result in reduction of serum copper which leads to bone marrow depression along with widespread sensory and motor neuropathies. Moreover, petrochemical derived polymers such as vaseline used in most denture adhesive creams can contribute to the development of oral candidiasis and denture stomatitis.

The aim of this research study was to evaluate a new denture adhesive called OlivaFix Gold®, an organic olive oil-based, petrochemical-free, paraben and zinc-free denture adhesive cream. The results of the clinical trial, performed on 107 denture wearers in 3 countries representing different socio-economic characteristics of denture wearers (France, Italy and Romania) has shown that at least one of the 2 investigated parameters (VAS and KAPUR) improves in 84.11% of the patients. These results confirm that OlivaFix Gold® provides a 'healthy' alternative to conventional vaseline and/or zinc containing denture adhesive creams in terms of denture stability, retention, holding time, burning sensations and taste, and can improve the overall quality of life of denture wearers.

**Keywords:** Denture; Denture Adhesive; Health Related Quality of Life (HRQL) Questionnaire; Visual Analogue Scale (VAS); Modified Kapur Index Scale (MKIS)

## Introduction

According to a recent WHO report, oral health is a key indicator of overall health, wellbeing and quality of life [1]. Severe tooth loss and edentulism (no natural tooth) is considered one of the leading ten causes of Years Lived with Disability (YLD) in some high-income countries [2]. The WHO has estimated that 59% of Europeans no longer have their natural teeth. Among those who do not have all their natural teeth, with differences from one country to another, almost a third (31%) wears a removable denture, and still 29% of European denture wearers have worn it for at least ten years [3]. In recent years, there have been significant advances in dental treatments to overcome tooth loss: dental implants are very often used as suitable alternatives for oral rehabilitation, however for most edentulous patients the main treatment alternative involves the use of conventional complete dentures that are aesthetically acceptable and have a much lower cost [4].

Despite the fact that denture adhesive creams are not fully endorsed by the dental professional community, these products, classified as medical devices, have demonstrated to be very helpful to denture wearers which is supported by a large number of scientific publications. In particular, denture adhesives are found advantageous and satisfactory by a substantial proportion of edentulous patients in providing better retention of their dentures [5] and when properly used, are beneficial to the patients in improved fit, comfort, function, and psychological security [6].

Many denture wearers utilize denture adhesives as an over-the-counter approach to improve retention and stability. In fact, patients "satisfaction" is not only due to adhesiveness, but also to psychological factors and the pain caused by dental prostheses movements. Clearly, the technical quality of dentures is certainly important, but medical and psychological factors are also considered to be contributory [7,8]. The two critical issues associated with the use of a denture adhesive is its efficacy in improving function and its effect on the health of the underlying oral tissues [9]. Complete denture wearers using denture adhesives improve their digestion as they allow patients to chew foods of a harder consistency. Therefore, denture adhesives may improve the general health of complete denture wearers [10].

However recently research has reported the potential risks associated with prolonged use of denture adhesive creams. For instance excessive zinc ingestion from the overuse of zinc-containing denture adhesives can cause elevation of serum zinc levels that result in reduction of serum copper which leads to bone marrow depression along with widespread sensory and motor neuropathies [11]. As a result, the US FDA recommends to the denture adhesive wearers: "Understand that some denture adhesives contain zinc, and that although they are safe to use in moderation as directed, if overused, they could contribute to harmful effects if over-used" [12]. As a consequence, some action has been taken by companies supplying denture adhesives to respond to the market needs for safer products. Today some zinc-free denture adhesives are available while other companies launched adhesives with "natural" ingredients with the aim of reducing the risks associated with the prolonged denture adhesive use.

The aim of the research study was to evaluate a 'new generation' denture adhesive called OlivaFix Gold® (bonyf AG, Vaduz, Liechtenstein), a petrochemical free adhesive cream composed of 35% organic olive-oil containing no zinc and no parabens. Previously evidence-based and clinically relevant information published in USA showed that patients using OlivaFix Gold® were very satisfied in terms of ease of use, effectiveness, adhesion of upper and lower denture, taste, improvement in chewing, ease of removal, improvement in ability to chew and mouth-feel after applying [13].

We therefore designed a study to investigate the use of OlivaFix Gold® on a total of 107 denture wearers living in 3 different European countries with different socio-economic conditions as well as different patient dental care education: France, Italy and Romania. Data report that 15% of French people are denture wearers [23], 9.5% of Italians wears a denture [22] and 30% of Romanians have not teeth [21].

We also decided to select private denture clinics to best represent the "ideal patient" user of denture adhesive and/or first user.

Two different parameters were taken into account for product evaluation: both patient point of view as well as the professionally based assessment of complete denture quality. The patient satisfaction was investigated through a Health Related Quality of Life (HRQL) questionnaire [14,15] and Visual Analogue Scale (VAS) [16-18]. The professionally based assessment of complete denture quality was investigated through Modified Kapur Index Scale (MKIS) [19,20] to record the masticatory efficacy and maximum bite forces until denture

dislodgement of the denture.

In order to collect results as reliable as possible, some precautions were applied in the “study project” and in the “data processing”. In addition, the data processing and analysis was carried out by an independent statistician allowing an objective analysis of the two parameters VAS and MKIS separately.

### Materials and Methods

The study was approved by Institutional Ethics Committee and included the participation of 15 dental clinicians (5 from France, 7 from Italy and 3 from Romania) who were particularly engaged in removable denture restorations. All clinicians received information on the overall outline of the study as well as a brief training related to the project steps through slides and videoconference; a centralized file hosting system was used to share all relevant documents.

OlivaFix Gold® (bonyf AG, Vaduz, Liechtenstein) was supplied to all dental clinicians. Each dental clinician enrolled denture wearers based on the following inclusion criteria:

- Patients who wear a denture
- Patients who use a denture adhesive cream, or not at all
- Patients expressing at least one discomfort related to the use of their denture.

Any related systemic disease condition was not a parameter of exclusion. However, patients that were not able to answer the questionnaires (due to mental or other disease related limitations) were excluded from the study.

### The trial was conducted following a very specific protocol:

- 1) First Visit:** After filling out the written consent for trial participation, a VAS (Initial VAS) was performed by the participant to document the type and level of discomfort produced by the denture, based on a score from 0 (best) to 10 (worst). The HQRL questionnaire contained also a question related to the ‘hold in hours’, reserved for the denture wearers that were already using a denture adhesive cream (Initial hold in hours). At the same visit, the dental clinician (investigator) filled out a MKIS (modified Kapur Inedx Scale) questionnaire (initial Kapur) based on a similar score from 0 (worst) to 10 (best). In addition, photographs of the denture wearer’s mouth were taken. A tube of OlivaFix Gold® was given to each participant. The dental clinician instructed the patient on how to use OlivaFix Gold® and how to correctly clean his denture.
- 2) Second visit:** The re-evaluation was conducted after a standard period of seven days. Each participant filled out a new VAS (Final VAS) relative to the discomfort recorded after using of OlivaFix Gold®. The question concerning the ‘hold in hours’ (Final hold in hours) was repeated. In addition, the taste of OlivaFix Gold® was investigated through a “taste scale” ranged from 0 (very bad) to 5 (very good). During the re-evaluation, the investigator monitored the absence of any reaction on the gums and filled out a new MKIS (Modified Kapur Index Scale) questionnaire (Final Kapur). Again photographic images were taken.

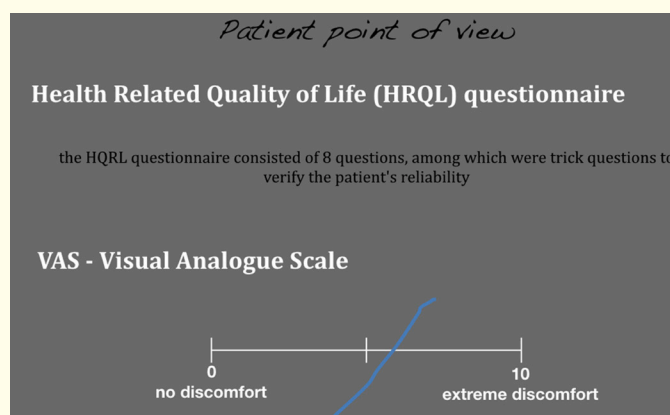


Figure 1: VAS scoring system (0-10).

*professionally based assessment  
of complete denture quality*

**MKIS**  
**Modified Kapur Index Scale**

SCORE	RETENTION	STABILITY
0	Denture displaces itself	Demonstrate extreme rocking on its supporting structures under pressure
1	Slight resistance to vertical pull and little or no resistance to lateral force	Demonstrate moderate rocking on its supporting structures under pressure
2	Moderate resistance to vertical pull and little or no resistance to lateral force	Demonstrate slight rocking on its supporting structures under pressure
3	Moderate resistance to vertical pull and lateral force	Demonstrate very slight rocking on its supporting structure and pressure
4	Very good resistance to vertical pull and lateral force	Demonstrate no rocking on its supporting structures under pressure
5	Excellent resistance to vertical pull and lateral force	-----

Figure 2: MKIS scoring system (0-10).

All data was collected and stored in a database. Any incomplete records were deleted.

### Statistical analysis

In order to compare VAS, Kapur and 'hold in hours' data between the initial value (value at first visit) and final value (value recorded after 7 days), data normality of VAS, Kapur and 'hold in hours' was evaluated by the Shapiro-Wilk test. Data were found to be statistically different ( $p > 0.05$ ). Additional analysis was performed with the Wilcoxon Matched Pairs Test (significance level  $p < 0.05$ ) [24]. In addition, 3 additional parameters were calculated: Delta VAS defined as final VAS - initial VAS; Delta Kapur defined as final Kapur - initial Kapur, and Delta hours defined as final hold in hours - initial hold in hours. For the evaluation of the investigated parameters in relation to the type of denture (upper or lower), the Mann-Whitney U Test has been employed ( $p > 0.05$ ). Linear correlations have been evaluated according to Pearson's Linear Correlation method [24].

All data were statistically analyzed with STATISTICA (data analysis software system), version 7. www.statsoft.com.

### Results

The 15 dental clinicians participating in the study were distributed as follows: 7 in Italy, 5 in France, and 3 in Romania.

The 107 participants participated in the study and were distributed as follows: 43 males and 64 females, aged between 36 and 94 years (mean  $\pm$  SE:  $71.17 \pm 1.01$ ), of which 39 in Italy, 34 in France and 34 in Romania. 58 participants wear lower denture wearers (54.2%) while 49 were upper denture wearers (45.8%). Among the participants, 80 (74.8%) were already users of denture adhesive while 27 (25.2%) never used denture adhesive before. The 80 denture adhesive users all used commonly commercialized denture adhesive brands including Kukident®, Polident®, Fixodent®, Steradent® and Corega® (Figure 3 and 4).

The mean initial VAS recorded at the study onset was  $5.2 \pm 0.3$  (mean  $\pm$  SE) out of 10; the mean final VAS recorded at day 7 was  $2.7 \pm 0.2$  ( $p < 0.01$ ). The VAS improved in 76.6% of patients, remained unchanged in 19.6% while it worsened in 7% of participants (Figure 5).

The mean result of the MKIS (Modified Kapur Index Scale) recorded during the first visit was  $3.8 \pm 0.2$  out of 10 while the reevaluation mean MKIS at day 7 was  $4.9 \pm 0.2$  out of 10 ( $p < 0.01$ ). The dental clinicians recorded an improvement in 60 patients (56%) while in 47 (44%) the same conditions as initially recorded remained. No one worsened (0%) (Figure 6).

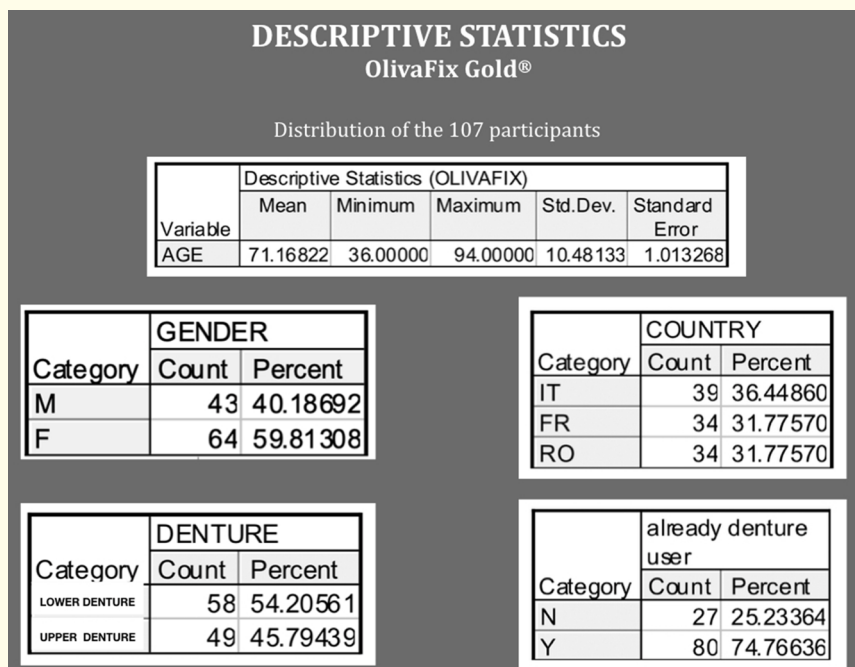


Figure 3: Descriptive Statistics - OlivaFix Gold®.

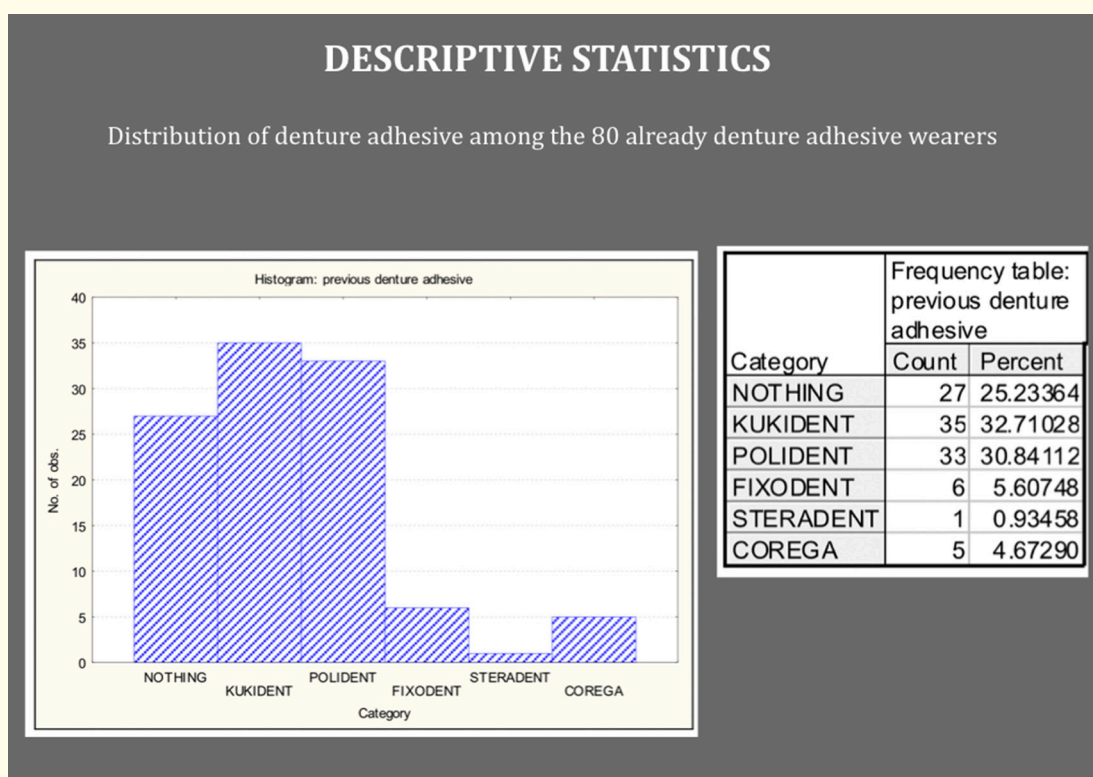


Figure 4: Histogram: previous denture adhesive users.

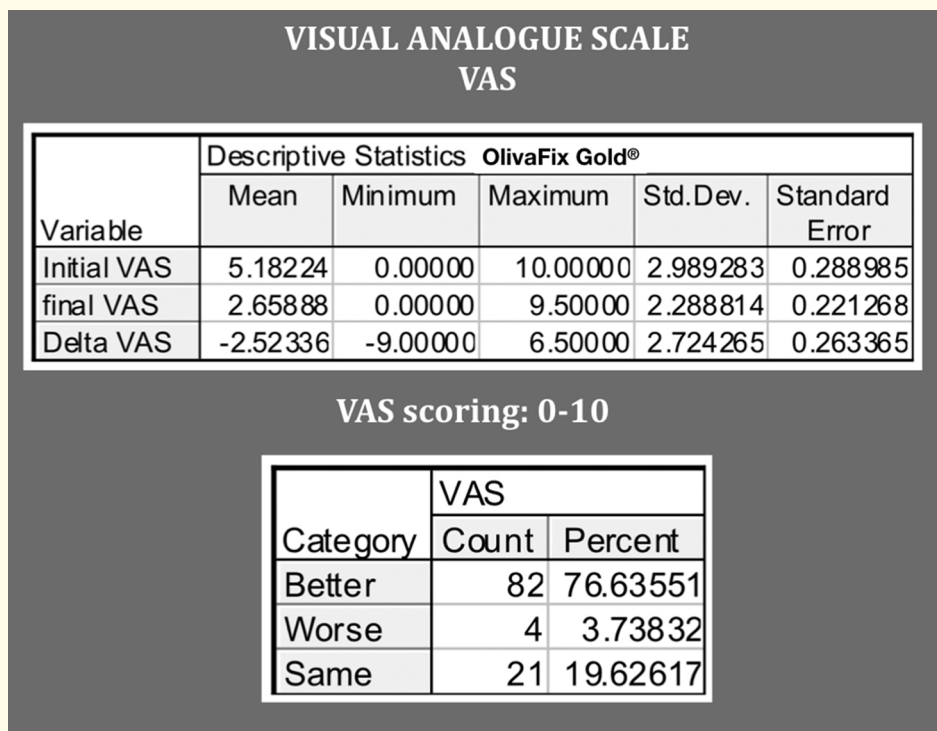


Figure 5: Descriptive statistics of VAS related to the use of OlivaFix Gold®.

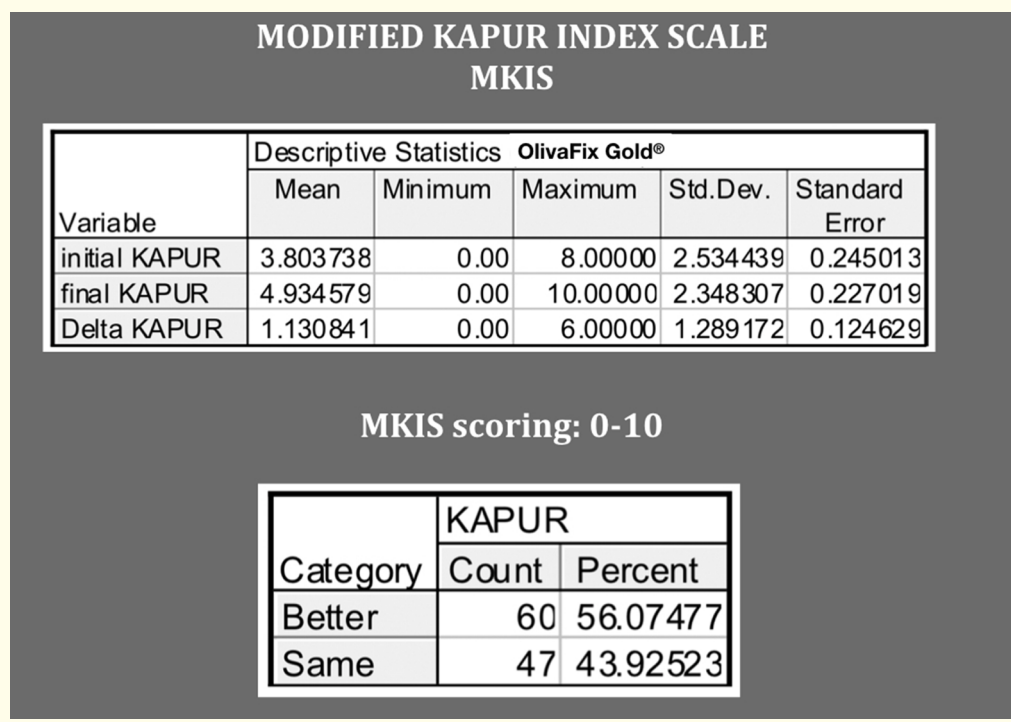


Figure 6: Descriptive statistics of modified Kapur Index Scale related to the use of OlivaFix Gold®.

The parameter ‘hold in hours’ was only measured in the 80 patients already using a denture adhesive cream. A better hold in hours was observed in 74% of patients, unchanged in 22% while worse in 1% (Figure 7). Notably, the difference between initial ‘hold in hours’ ( $6.5 \pm 0.4$ ) and ‘final hold in hours’ ( $10.7 \pm 0.4$ ) is statistically significant ( $p < 0.01$ ).

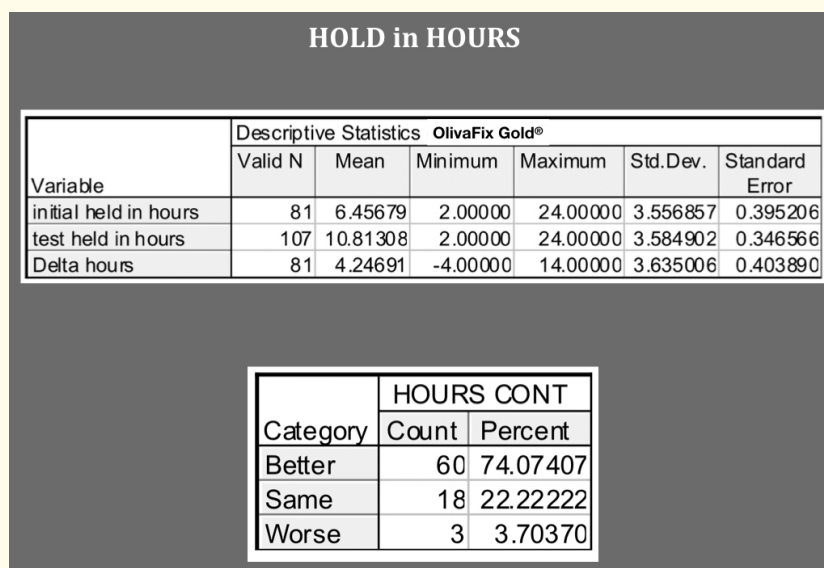


Figure 7: Descriptive statistics of ‘hold in hours’ related to the use of OlivaFix Gold® in the 80 denture wearers that already used a denture fixative cream.

No differences in VAS were observed between upper denture and lower denture wearers. There was however a statistically significant difference in the ‘Initial Kapur’ and in the ‘Final Kapur’ after 7 days: in both, the Kapur parameter was higher in upper denture wearers than in lower denture wearers ( $p < 0.01$ ). There was also no difference between upper and lower denture wearers in the “Delta Kapur”.

A statistically significant difference was also observed in both the ‘initial hold in hours’ and in the ‘final hold in hours’, in both, the values were higher upper denture wearers ( $p < 0.01$ ). There was no difference between upper and lower denture wearers for the Delta hours parameter. However, the values of the upper denture wearers were higher than for the lower denture wearers, both for initial as well as final values of the Kapur as well as for the hold in hours.

No statistically significant differences in the VAS, Kapur and hold in hours were observed between males and females. Regarding the 80 participants who were already users of denture adhesives, no statistically significant differences in the VAS were observed.

Regarding the taste parameter, the mean taste registered for OlivaFix Gold® was 3.42.

When using the ‘Pearson correlations’, a very strong correlation was observed between ‘Initial Kapur’ and the ‘Final Kapur’ ( $r = .86, p < 0.01$ ) as compared to the ‘Initial VAS’ and “Final VAS” ( $r = .49, p < .001$ ) indicating that the “clinical evaluation” parameter is very reliable.

In addition, also the taste parameter is correlated with final VAS ( $r = -0.26, p < 0.008$ ) but also with the ‘hold in hours’ parameter ( $r = .32, p < 0.001$ ) and the delta ‘hold in hours’ ( $r = 0.28, p = 0.11$ ), indicating high satisfaction of the patient with OlivaFix Gold®.

Also the parameter ‘hold in hours’ plays a fundamental role in the patient’s ‘sensations’: this can be concluded since the Delta Hours parameter is related to “Delta VAS” ( $r = -0.38, p < 0.001$ ) but not to the “Delta Kapur” parameter ( $r = -0.008, p < .945$ ).

The ‘Delta VAS’ and ‘Delta Kapur’ parameters also match in a statistically significant way ( $r = -0.2368, p < .05$ ). The intensity of the VAS improvement is related to the intensity of the Kapur improvement. This means that the positive sensations of the patient are confirmed by the clinical observations noted by the clinicians.

Finally, the variation of 'Delta VAS' is statistically significant correlated ( $r = 0.5236$ ,  $p < 0.001$ ) with the 'initial hold in hours' and negatively with the 'Delta hold in hours' ( $r = -3.765$ ,  $p < 0.001$ ) meaning that the initial sensations (VAS) recorded by the patient are conditioned by the 'hold in hours' parameter.

## Discussion

The use of denture adhesives is relatively widespread among denture wearers. However, many denture wearers often use denture adhesives without consultation and proper prescription by the dentist and this often leads to dissatisfaction [25,26]. The outcome of this study performed with OlivaFix Gold®, a next-generation denture adhesive cream based on organic olive-oil, confirm the benefits linked to the use of denture adhesives, as was previously evidenced by numerous scientific publications and help to improve the retention and stability of dentures [26-30] therefore improving the quality of life and general health [14,31], in particular for patients who seek extra retention demands that can't be achieved by the routine protocol of complete denture construction [32].

The data analysis indicates that OlivaFix Gold® demonstrates a clear improvement in Kapur parameter and is statistically significant for those who did not use a denture adhesive before. The most common complaints registered in the trial confirm what already cited in literature; the lack of retention or stability and accumulation of food particles under the denture [26,33,34]. The professionally based assessment through the Modified Kapur Index Scale (MKIS) and the 107 patient-based outcomes, obtained through an oral health-related quality of life questionnaire, have shown to be effective in assessing the performance of OlivaFix Gold® [20].

Considering the Pearson correlations referring to the 107 patients that used OlivaFix Gold®, we can conclude that:

- Both parameters (VAS or Kapur) improve in 48.60% of the participants.
- At least one of the 2 parameters (VAS or Kapur) improves in 84.11% of the participants
- None of the 2 parameters (VAS or Kapur) improves in 15.89% of the participants
- Both parameters (VAS and Kapur) deteriorate in 0% of the patients.

Another accurate assessment of OlivaFix Gold® could be performed in the subgroup already using denture adhesive creams; in this group a better evaluation of the parameter 'hold in hours' is considered.

Based on the Pearson correlations performed in this group of 80 patients that used OlivaFix Gold®, we can conclude:

- At least one of the 3 parameters (VAS, Kapur and hold in hours) improves in 87.65% of the participants
- All 3 parameters (VAS, Kapur and hold in hours) improve in 35, 80% of the participants.
- None of the 3 parameters (VAS, Kapur and hold in hours) improves in 12.35% of the participants
- None parameters (VAS, Kapur and hold in hours) deteriorate in 0% of the patients

Another interesting observation generated by Pearson correlation is that those denture wearers that used OlivaFix Gold®, who show an improved VAS (subjective parameter) are those who that were less likely to have used a denture adhesive (before the test) and also those that increased the "hold in hours" respect the old adhesive.

Regarding the "taste" of OlivaFix Gold®, we observed a taste score  $\geq 3$  in 75.70% of the participants, considering a scale 0-5.

The results of the this study with OlivaFix Gold® are very encouraging especially since this denture adhesive cream is the only organic olive oil based, zinc and paraben free product currently on the market. Despite the initial actions in responding to the market with 'natural products', there are still observations showing discomfort or oral mucosal lesions caused by adhesives [35,36].

## Conclusion

The results of this study with OlivaFix Gold® are very encouraging. OlivaFix Gold® has shown a very good performance in both the professionally based assessment (Modified Kapur Index Scale) and in the multiple patient-based outcomes (VAS): at least one of the 2 investigated parameters (VAS and KAPUR) improves in 84.11% of the patients. In addition, OlivaFix Gold® being a biologically denture adhesive cream that contains 35% organic olive-oil, and no petrochemicals, no zinc and no parabens, provides denture wearers today to

choose a healthy product that can be used daily to assure of denture stability, retention, holding time, burning sensations and taste, hence substantially improving the overall quality of life of denture wearers.

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### Bibliography

1. World Health Organization. "Oral health key facts" (2018).
2. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. "Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016". *Lancet* 390.10100 (2017): 1211-1259.
3. World Health Organization. "World Oral Health Report 2003" (2018).
4. Carlsson GE and Omar R. "The future of complete dentures in oral rehabilitation. A critical review". *Journal of Oral Rehabilitation* 37.2 (2010): 143-156.
5. Felton D., et al. "Evidence based guidelines for the care and maintenance of complete dentures-a publication of the American College of Prosthodontics". *Journal of Prosthodontics* 20 (2011): S1-12.
6. Weidner-Strahl SK. "Clinical multicenter testing of various indications for denture adhesives". *Quintessenz* 35 (1984): 1547-1551.
7. Brunello DL and Mandikos MN. "Construction faults, age, gender, and relative medical health: factors associated with complaints in complete denture patients". *Journal of Prosthetic Dentistry* 79.5 (1998): 545-554.
8. Beck CB,, et al. "A survey of the dissatisfied denture patient". *European Journal of Prosthodontics and Restorative Dentistry* 2.2 (1993): 73-78.
9. Grasso JE., et al. "Effect of denture adhesive on the retention and stability of maxillary dentures". *Journal of Prosthetic Dentistry* 72.4 (1994): 399-340.
10. Grasso JE. "Denture adhesives: Changing attitudes". *The Journal of the American Dental Association* 127.1 (1996): 90-96.
11. Tezvergil-Mutluay A, et al. "Hyperzincemia from ingestion of denture adhesives". *Journal of Prosthetic Dentistry*. 103.6 (2010): 380-383.
12. FDA
13. DENTAL ADVISOR
14. Kelsey CC., et al. "Examining patients' responses about the effectiveness of five denture adhesive pastes". *The Journal of the American Dental Association*. 128.11 (1997): 1532-1538.
15. Mascolo, A. "Effectiveness of a New Denture Adhesive Paste Containing Natural Ingredients (Food Grade) from a New Point of View: The Patient Satisfaction". *Advances in Dentistry and Oral Health* (2015).
16. Patil PG. "Utility of the visual analog scale in dentistry". *Indian Journal of Dental Research* 23 (2012): 836
17. Bilhan H., et al. Evaluation of satisfaction and complications in patients with existing complete dentures. *Journal of Oral Science* 55.1 (2013): 29-37.
18. Komagamine Y., et al. "Reliability and validity of a questionnaire for self-assessment of complete dentures". *BMC Oral Health* 14 (2014): 45.

19. Olshan AM., *et al.* "A modified Kapur scale for evaluating denture retention and stability: methodology study". *American Journal of Dentistry* 5.2 (1992): 88-90.
20. Limpuangthip N., *et al.* "Modified retention and stability criteria for complete denture wearers: A risk assessment tool for impaired masticatory ability and oral health-related quality of life". *Journal of Prosthetic Dentistry*. 120.1 (2018): 43-49.
21. [economia.net](http://economia.net)
22. EPICENTRO
23. SENIORACTU
24. Petrie A and Sabin C. "Medical Statistics at a Glance". 3<sup>rd</sup> Edition. Oxford: Wiley Blackwell (2009). ISBN: 978-1-405-18051-1
25. Pradies G., *et al.* "Clinical study comparing the efficacy of two denture adhesives in complete denture patients". *The International Journal of Prosthodontics* 22.4 (2009): 361-367.
26. Chen JH., *et al.* "Dentist-Patient Communication and Denture Quality Associated with Complete Denture Satisfaction Among Taiwanese Elderly Wearers". *The International Journal of Prosthodontics*. 28.5 (2015): 531-537.
27. De Oliveira JN., *et al.* "Masticatory performance of complete denture wearers after using two adhesives: A cross- over randomized clinical trial". *Journal of Prosthetic Dentistry*. 112.5 (2014): 1182-1187.
28. Torres-Sánchez C., *et al.* "Comparison of masticatory efficacy among complete denture wearers with two adhesives and dentate individuals: A randomized, crossover, double-blind clinical trial". *Journal of Prosthetic Dentistry* 117 (2017): 614-620.
29. Slaughter A., *et al.* "Professional attitudes toward denture adhesives: a Delphi Technique survey of academic prosthodontist". *Journal of Prosthetic Dentistry*. 82 (1999): 80-89.
30. Farzin M., *et al.* "The effect of two types of denture adhesive on the satisfaction parameters of complete denture wearers". *Journal of Dental Biomaterials* 4.3 (2017): 425-430.
31. Rendell JK., *et al.* "The effect of denture adhesive on mandibular movement during chewing". *The Journal of the American Dental Association*. 131.7 (2000): 981-986.
32. De Baat C., *et al.* "An international multicenter study on the effectiveness of a denture adhesive in maxillary dentures using disposable gnathometers". *Clinical Oral Investigations*. 11.3 (2007): 237-243.
33. Siadat H., *et al.* "Patient satisfaction with implant-retained mandibular overdentures: a retrospective study". *Clinical Implant Dentistry and Related Research*. 10.2 (2008): 93-98.
34. Emami E., *et al.* "Impact of implant support for mandibular dentures on satisfaction, oral and general health-related quality of life: a meta-analysis of randomized controlled trials". *Clinical Oral Implants Research*. 20.6 (2009): 533-544.
35. Bogucki ZA., *et al.* "A clinical evaluation denture adhesives used by patients with xerostomia". *Medicine (Baltimore)* 94.7 (2015): e545.
36. Al RH., *et al.* "Irritation and cytotoxic potential of denture adhesives". *Gerodontology* 22.3 (2005): 177-183.

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