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DENTAL SCIENCE
Research Article

Influence of Two Acrylic Dentures on Salivary Immunoglobulin A (SIgA): An *In-vivo* Study

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Received: April 10, 2015; **Published:** July 12, 2015

Abstract

The present study aimed to assess the level of salivary immunoglobulin A (sIgA) in response to two different acrylic resin denture base materials. The current study has been conducted on fourteen fully edentulous patients to assess the level of salivary immunoglobulin A (sIgA) in them in response to both Heat cure acrylic resin and Thermoplastic cure acrylic resin (Thermopress) complete denture base materials. Four different samples were collected for each subject in non stimulating environments for salivary secretions. The first sample was collected pre-denture insertion. The other three samples were collected two hours, three days and seven days post-denture insertion. It has been recorded that there was a gradual decrease in the level of sIgA in all the post-denture insertion samples on comparing them to the control of each patient. The massive decrease in the level of sIgA was apparent only in the salivary samples collected seven days post-denture insertion in patients with the heat cured acrylic resin denture base material which reveals the significance of the last post-denture insertion in the present study. It has been concluded wearing complete denture fabricated from both Heat cure acrylic resin denture base material might be immunosuppressive, while the thermoplastic one is an immune enhancing material.

Keywords: *Complete denture; Saliva; Salivary Immunoglobulin A; Heat cure acrylic resin; Thermoplastic acrylic resin*

Introduction

Denture base is considered as one of the major parts in most of the removable prosthetic appliances. It is that part of the denture which rests on soft tissues of the oral cavity carrying the artificial teeth. Polymethyl methacrylate denture base material is considered one of the most commonly used denture base materials in prosthetic appliances. The era of thermoplastic acrylic resin denture base material (Thermopress) has been appeared.

The insertion of complete dentures intraorally may induce a foreign body reaction. It's direct and intimate contact with wide areas of oral soft tissues and being closely associated to both minor and major salivary glands may alter the salivary flow rate as well as the concentration of saliva constituents [1].

The immune system is considered the physiologic mechanism that allows human body to recognize things as foreign and to respond against it. The mucosal immune system is a separate entity of the local immunity; constitutes the first line of antigen specific immune protection against pathogens and antigens at the mucosal surfaces especially in the oral cavity. The oral cavity represents an essential compartment of this system [2].

Salivary immunoglobulin A (sIgA) is considered as the major secretory immunoglobulin in the oral cavity. Secretory antibodies of immunoglobulin A (IgA) class are the most predominant immunoglobulin of the mucosal immune system [3].

All the prosthetic appliances in the oral cavity are immersed in mixed saliva. This saliva is a complex mixture of secretions from major and minor Salivary glands. The major source of salivary immunoglobulin A (sIgA) are the plasma cells. They exist adjacent to the duct and acini of the salivary glands. Sub-epithelial lymphoid aggregations were determined for being an additional Major source of sIgA [4,5].

The present study was designed to use salivary immunoglobulin A (sIgA) as a caliber to assess the response of oral immunocompetence to prosthetic appliances. Complete denture was utilized as a representative of the prosthetic work fabricated from; heat cured acrylic resin and recent thermoplastic heat cure acrylic resin denture base materials.

Materials and Methods

The present study has been conducted on fourteen completely edentulous patients. The selected patients possess some criteria; Male completely edentulous patients, their age ranged from 50-60 years. Last tooth extracted was at least from four to six months prior to denture construction.

The selected patients had well developed ridge covered with firm mucoperiostium. All patients were having sufficient interarch space and class I Angle's classification.

All selected patients had no systemic diseases that might affect the condition of the residual alveolar ridge, and that might interfere with immunocompetence. Salivary glands were free from any systemic disease that affects salivary secretions.

Patients' had no previous history with any type of Oral Prosthodontics. Patients with tempro-mandibular joint problems were excluded. Routine digital panoramic radiograph was carried out to all patients. The fourteen selected patients were randomly divided into two equal groups; A &B:

Group A: Conventional Heat cure acrylic resin* denture base material.

Figure 1: *Conventional upper and lower complete dentures with heat cure acrylic resin denture base material.*

Group (B): Thermoplastic cure acrylic resin** denture base material (Thermopress).

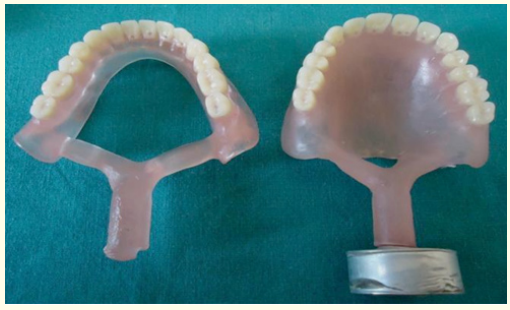

Figure 2: *Upper and lower complete dentures with thermoplastic acrylic resin denture base material.*

Upper and lower complete dentures for all the selected patients have been fabricated in the conventional technique for both heat cure acrylic resin and metallic cobalt chromium complete dentures. The regular instructions for complete denture wearers were given to all subjects. Continuous denture wearing all day and night during the follow up period has been a very essential. Step and obligatory only in the present study. All patients have been instructed to avoid taking any medications during the follow up period. After the follow up period has passed, all subjects have been instructed to keep their dentures in a container filled with tap water during sleeping hours and when their dentures are not in use [6,7].

All samples were collected in non stimulating environments for salivary secretions. Non stimulated saliva was collected in 4 different samples for each patient. The first sample was collected immediately before denture insertion. The other 3 samples were collected at the follow up period; 2 hours, 3 days and 7 days after acrylic complete denture insertion. Patients have been instructed not to ingest food or drinks at least 60 minutes before sample collection [8,9].

Ten milliliters of patient's saliva has been collected in a plastic clean dry collection tube of 5 cm in length. These samples have been kept in a cold ice chest immediately after collection. The samples have been centrifuged at 3000 rpm for 15 minutes. Sample supernatant have been stored at -20°C freezer until they were all ready for analysis.

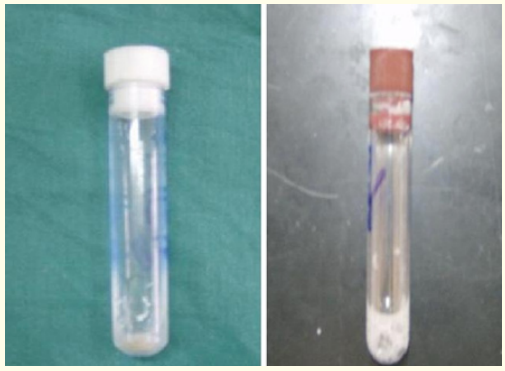

Figure 3&4: *Patient's saliva immediately after being collected.*
Salivary sample supernatant.

Concentration of salivary immunoglobulin A (sIgA) has been measured by using Enzyme Linked Immunosorbent Assay (ELISA) Kit* (96 wells) for quantitative determination of IgA in human saliva All the collected salivary samples were analyzed using the ELISA device writer and reader* to determine the percentage of the level of sIgA in each sample. The resulting data for each patient were collected, tabulated and statistically analyzed using the T- test [10].

Figure 5&6: *ELISA device writer.*
ELISA device reader.

Results

It has been recorded that all patients have tolerated their complete dentures and their dentures have been used according the instructions given. It has been reported that no traumatic ulcers, white lesion or allergies were observed among all patients on their regular check up during the follow-up period. It has been detected that no significant case suffered from allergy in the present study.

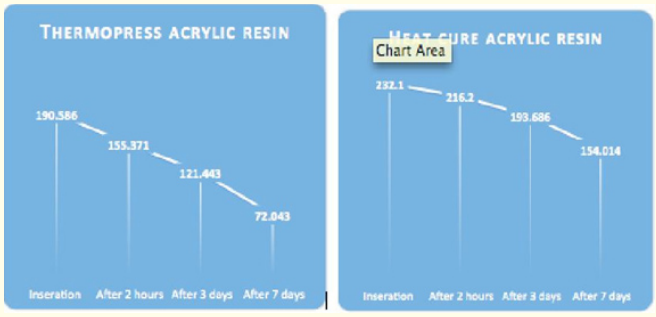

Figure 7: *A line chart showing mean values of biting of sIgA recorded for the heat cured and thermoplastic cured acrylic resin dentures along the follow up period (mg/L).*

Discussion

The regressive and continuous decrease in the level of salivary immunoglobulin A (sIgA) starting immediately after complete denture insertion in both groups of the current study and extended till the third day post-operatively, though it is not statistically significant only in these two groups but it is observable. This continuous decrease might be attributed to the psychological stress and hyper salivation associated with early patient reaction to the complete denture. This explanation is supported by the opinion of several authors. [11-13].

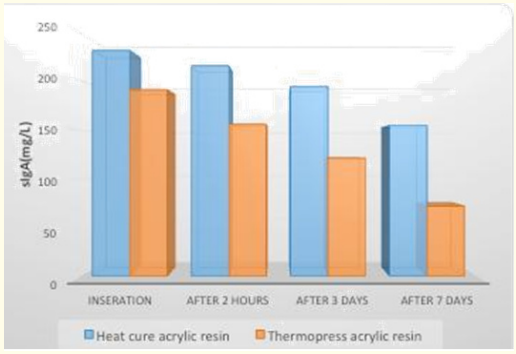

Figure 8: *A bar chart showing mean values of biting of sIgA recorded for the heat cured and thermoplastic cured acrylic resin dentures along the follow up period.*

The progressive and continuous decrease of sIgA three days and seven days sIgA might be attributed to denture insertion in these two groups. The placement of complete denture might aggravate this decrease either by its mechanical or chemical effect or both of them. The mechanical effect of the complete denture might explain this decrease due to its direct contact with oral soft tissues and transmucosal covering of some salivary glands. This direct contact is represented by covering the openings of the sublingual, buccal and labial minor salivary glands and which is highly remarkable in complete denture wearers of all groups used in the current study. [14-15].

The transmucosal covering is represented in the palate where the whole palate is covered by the acrylic denture base in complete dentures of both first and second groups, which might interfere with transmucosal and glandular transfer of salivary immunoglobulin A (sIgA). This explanation coincides with the opinion of various authors [14-15].

The chemical effect of complete denture might be used to explain the massive decrease of sIgA. The different and variable constituents entering in manufacturing of complete denture may be accused as a possible factor in the drop of sIgA. These ingredients extend to involve liquid such as monomer, inhibitor, accelerator, plasticizer and cross-linking agent, while the powder includes pigments and plasticizers [16].

Conclusion

The Heat cure acrylic resin denture base materials have a direct deleterious effect on the level of salivary immunoglobulin A (sIgA) at the third day and seven days post-denture insertion sample. However the thermoplastic cure acrylic resin (Thermopress) denture base material is an immune enhancement material. The immunosuppressive effect on the level of salivary immunoglobulin A (sIgA) at the seven days post-denture insertion sample was observed when being constructed from Heat cure acrylic resin denture base material.

Recommendations

1. Further studies and investigations including wide scale of patients, larger number of patient samples and extended duration of follow up.
2. Further studies are recommended to be carried out on diabetic patients as they represent a wide range of the Egyptian population.

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Volume 2 Issue 1 July 2015