The Effect of *Salvia Officinalis* Disinfectant on Biological Characteristics

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Research Article

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Abstract

Background: Polymethyl methacrylate (PMMA) and methyl methacrylate have been the most frequently utilized polymers in acrylic resin manufacturing (MMA). Bioactivity is extremely important in restorative dentistry as well as other composite resins.

Methods: The bioactivity of the substances was determined by comparing them to the control materials. Rabbits were implanted subcutaneously. A total of fifty samples are produced, with five samples for every one of the five time intervals. A biological investigation Following One day, three days, one week, two weeks, then four weeks, incision tissues are obtained. On a microscopic level, with the progression of such a tissue response in connection to the infection, the number of inflammatory cells was employed as a metric. Stuff that has been thoroughly examined in contrast to the reference, the biological characteristics of the prepared material are assessed. Acrylic resin is used as a prosthesis basis, samples were divided into two categories: Group1: Poly methyl methacrylate + methyl methacrylate as a control group. Group 2: Is made up of 75% poly methyl methacrylate and 25% salvia officinalis extracts as experiment.

Results: The average score numbers of the study and positive control sections did not change significantly following three, one week, two weeks, or four weeks.

Conclusion: Salvia Officinalis Extracts is biocompatible comparable to that of methyl methacrylate.

Introduction

Polymethyl methacrylate (PMMA) and methyl methacrylate (MMA) are the most prevalent polymers used to make prosthesis bases processing for heat-cured, changed, or modified materials. Denture basic acrylic resin has been changed and transported via manufacturing of polymethyl methacrylate is a type of polymer, with regard to the liquid component monomer is made up of methyl methacrylate(1).

Biocompatibility is extremely true when it comes to advancements in prosthodontics and other restorative .The materials that these professionals rely on for as long as possible, stay in close proximity to live tissue for an extended period of time. Rabbits are among the earliest laboratory models, and because they are mammals, they are useful in biocompatibility studies to the human immune system.(2) The most common outcome of an inflammatory response is trauma and damage have an impact on the body's reaction. These will be the replies as a structure, relying upon that alien body. It may induce minor, medium, or severe symptoms depending on the activity and intensity a severe reaction.(3)

The study's goal was to come up with an estimate of the reaction of the tissue to the prepared substance in comparison to what is commercially available substance (control).

Procedure

The samples were produced and used a fast curing cycle 90 minutes (at 74°C) completed by 30 minutes (at 100°C). The biological characteristics of, the test materials were appraised with the acrylic resin denture base (control). The graft copolymerization has been used to make the polymer approach. Samples were divided into two categories:

First group, consists of methyl methacrylate and poly methyl methacrylate (as a reference) was used.

Second group, Poly methyl methacrylate (75%) and salvia officinalis extracts (25%) + methyl methacrylate (as experiment).

By weight, the P/L ratio is 2.5:1. (A.D.A. No. 12, A.D.A. No. 12, A.D.A. No. 1999). Animal implantation (in vivo) of a number of 25 young New South Wales rabbits was used to examine the bioactivity of the produced and reference substances (15 male and 10 female. The research examined animals weighing 1-2 kg., the rabbits are divided into five subgroups based on their behavior, one day, three days, one week, two weeks, and four weeks, each subgroup had five rabbits.

Implantation: For the experimental and controlled materials, round discs with a diameter of 6 mm and a thickness of 3 mm are manufactured (figure 1). The Sodium hypochlorite was used to soak the samples (0.5%) for a period of ten minutes following treatment (yilmaz et al, 2005). Following sample sterilization, the samples had been washed with distilled water and kept in distilled water (prior to use) for 24 hours at 37°C. Fifty different specimens are utilized, and 25 samples were made from each materials for a control sample and materials for a study.

Procedure of Implantation: The tools used for the surgical operation were disinfected in an autoclave at 100 °C for 60 minutes, and sterile stitches, syringes, as well as scalpel blades were employed. The anesthetic liquid was administered via intramuscular injections of ketamin HCL and xylocain 2%. The dosage was set at 1 ml/kg, and the animal remained sedated during the procedure. The skin hair in the distal dorsum region had been shaven the day before. After disinfecting the surgical site, a 1 cm long cut is made inside the rabbit's skin. To construct a pouch for the sample, the subcutaneous supramascular layers were stretched with a rounded, blunt end device. With such a pair of tweezers, the sample was grasped and put into the pouches 1 cm away from the incision line (figure 2). The research sample was placed 4 cm apart on the rabbit's right side, whereas the reference sample was placed on the rabbit's left side. A similar surgical procedure was conducted 2 cm anterior to the test sample, but without any sample insertion, as a control sample. After the incision was patched back with a black silk stitch, the area was washed and sterilized (figure 3).

Microscopically Examination

i- Excision Biopsy: The rabbit and implanted site were re-anesthetized, then the rabbit and implanted site were reshaped, washed, and sterilized as needed. One centimeter away from the sample on each side was put in 10% buffered formalin for one day for fixation, and the biopsy was embedded in paraffin wax cross sections (4–6 μ m) were made from the central paraffin wax after one day, three days, one week,

two weeks, and four weeks. Three slices of each specimen are obtained for microscopy analysis as well as dyed with Mayerk's Hematoxylin and Eosin to make slides for histopathological evaluation underneath microscopy.

ii- Count inflammatory cells: A lens grid and microscopy have been used to count inflammatory cells in order to analyze tissue reaction to the tested compounds microscopically. Five readings were taken for each prepared slide, which were positioned and spaced at periodic times inside the sample region's perimeter. The maximum number of inflammatory cells were counted as a higher resolution quantification with the help of a pathologist, and a comparison was made between the tissue response of the control sample, negative control, and experiment samples.

Three distinct groups of rabbits were used to determine the reaction of the subcutaneous layer of the skin to the foreign object inserted. The first group (the experimental group) was made up of samples that included PVP powder and PMMA, the second group (the positive control group) was made up of samples that only included PMMA, and the third group (the negative control group) was made up of placebo samples. Three distinct places in each rabbit's subcutaneous layer of skin were investigated, and each site had five different places where one sample was inserted. The reaction of the subcutaneous layers of the skin to the foreign object via inflammation cells was determined in five time intervals for the first and second groups, namely one day, three days, one week, two weeks, and four weeks, whereas only three successive intervals had been considered for such a negative control group, namely one day, three days, one week, and two weeks.

Results

a- Macroscopic Findings: The implantation sites were examined thoroughly on a regular basis and revealed no evidence of significant irritation, discharge, or abnormalities. The incision healed without a hitch after seven days, the incised skin healed entirely and the skin overlaying the surgical region returned to normal. The surrounding region was felt during the evaluation, with the exception of the implanted samples, which were detectable through the skin.

b- Microscopical Findings: The histopathologist and operator thoroughly examined all produced slides at 50 and 100 magnifications. The t-test was used to compare the average counts of inflammatory cells for both the three locations studied in Table 1. The negative control mean and SD number of inflammatory cells (10.280 ± 1.280) was much lower than that of the tested materials, according to the data. In this table, it's simple to see how the number of inflammatory cells in the experimental (29.360 ± 2.936) decreases. That is not statistically significant, but still better than the control sample (30.133 ± 3.110). After three days, the mean and SD count values of the three groups (experimental, positive and negative control) showed a small rise. Table 1 compares the three mean counts of inflammatory cells using a t-test, which revealed a significant difference between the negative count (7.280 ± 0.728) and both materials studied. The average count values of the positive control (31.200 ± 3.120) and the experiment (30.707 ± 3.770) after three days showed no significant differences. 7-day period: In general, all of the

sections tested exhibited a decrease in the mean count of inflammatory cells. After seven days, highly significant differences were observed between the negative control mean count value (10.720 ± 1.720) and the other tested materials, while t-test values revealed no significant differences between the experimental (11.213 ± 1.121) and positive control (13.387 ± 1.333) mean counts of inflammation cells at $P < 0.05$.

Negative control section revealed zero count value in the following intervals of two weeks and four weeks, thus it was omitted from the comparative and statistical analysis. Generally, the number of inflammatory cells decreased gradually after these periods. There were no significant variations between the experimental and positive control portions' average count values. The t-test probability values ($P < 0.05$) are used to obtain these findings.

Discussion

The infiltration of polymorph leukocytes with inception following surgical operations was observed by microscopic examination in sections derived from biopsies of implanted samples and the negative control. As just a consequence of a surgical procedure or the implantation of a foreign object, those reactions are completely natural (specimen). Acute inflammation cells infiltrating irritated or injured areas with increased vascularity or permeability is a natural symptom of true inflammation. Craig, Ward (4), and Stevenson (3) concur with all these observations. Al-Ani et al. (5) saw the same appearance as a reaction to a few of the various types of acrylic, while Zmener et al. (6) observed the same picture as a reaction to methyl methacrylate-based endodontic sealer. The regions containing tested samples had greater counts of inflammatory cells than those of the negative control inflammatory cells. That might be related to the presence of test specimens that behave as foreign bodies, causing more inflammation. As a result (figure 4), the foreign body and trauma response of the soft tissue elicited the first severe inflammatory reaction, whereas the tissue reaction and inflammatory response were clearly caused by the test specimens in succeeding stages. This is because parts of the negative sampling sites exhibited progressive or full clearance after 2 weeks, which was consistent with Basima's 2006 (6) observations.

Histological examination after 4 weeks revealed normal tissues surrounding the control and experimental samples, as well as a well-developed connective tissue capsule free of anti-inflammatory cells, in accordance with Basima (7). These histology findings might suggest tissue tolerance to the compounds being evaluated. The resulting alterations in the tissues around the tested materials demonstrate this.

After the testing period, there were no significant changes in the number of inflammatory cells in response to the implanted experiment and the positive control sample, indicating that the biological reaction to the test specimens was similar, as Alexander (8) predicted. This might be due to the materials' chemical compositions being so close. The oil extract of sage was the most effective in inhibiting the studied microorganism, whose effect exceeded the use of chemical gargling lotion Chlorhexidine gluconate and alcoholic extract, which showed a lower rate of inhibition, while the aqueous extract did not show any inhibition of bacterial growth (9,10).

Conclusion

Salvia Officinalis Extracts is biocompatible comparable to that of methyl methacrylate and was the most effective in inhibiting the studied microorganism.

Declarations

Permission to publish

This is not the case

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Data plus supplies are readily available.

During this time, the data for this study region could not be released publicly. On a simple suggestion, it would be provided by the respective writer.

Consent to Participate and Approval of Ethics

The Al-Maaref University College of Dentistry department granted the ethical clearance of verbal informed consent and assent, and oral informed consent was received from the research subjects.

Contributions of the Authors

The author contributed significantly toward the report's conception, design, data, and methodology. The writer took part in the writing, revising, or critical evaluation of the article; gave final approval of the version to be published; agreed on the journal where the article would be published; and accepted responsibility for all aspects of the process.

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Tables

Table 1 is available in the Supplemental Files section.

Figures

Figure 1

Specimen of tested materials

Figure 2

Test specimen placed in the prepared pouch

Figure 3

Suturing of the incision

Figure 4

Distribution of mean number of inflammatory cells with respect to time

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Table.docx](#)