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Effect Of Fruit Juices on Surface of Soft Tissue Liners-And In Vitro Study

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ABSTRACT:

INTRODUCTION:

Resilient soft lining Materials can be useful for management of patient with removable prosthesis those who are unable to withstand the hard denture base due to underlying mucosa,resorption of residual ridge,several Undercuts and heavy and unequal distribution of occlusal loads and these are called the shock absorbers

MATERIALS AND METHODS:

10 sample of soft tissue liners discs was made with the diameter of 10mm and thickness of 4mm.2μm/60 stylus was used to measure the surface roughness.

Pre-Immersion surface roughness was measured for 10 samples using Mitutoyo SJ-310 Stylus profilometer and all the data are tabulated and then samples are divided into two groups and the group 1 samples are immersed in grape juice and group 2 samples are immersed in lemon juice for 1 week and then post immersion surface roughness was taken and all the data are averaged for pre and post immersion And it was analyzed using spss version 26

RESULT AND CONCLUSION:

We concluded that lemon juice has less ph and increases surface roughness than the grape juice which has less ph

Introduction:

Resilient soft lining materials can be useful for management of patient with removable prosthesis those who are unable to withstand the hard denture base due to underlying mucosa, resorption of residual ridge, several undercuts and heavy and unequal distribution of occlusal loads and these are called the shock absorbers (1). The most commonly used liners are plasticized acrylic resins. These resins can be heat-activated or chemically activated and are based on addition polymerization and apart from taking the masticatory impact soft tissue liners also used for prostheses fractures, remodelling of bone crests and cleft palate and even in case,9s of excessive resorption of alveolus and occurrence of lesion in mucosa(2). Soft liners are of two forms for use, one is heat polymerized and another is auto polymerized, and they are generally provided in powder and liquid(3). The powder usually consists of poly ethyl Methacrylate (PEMA) and liquid contains ethyl alcohol (as solvent) and an aromatic ester (dibutyl phthalate) as a plasticiser agent which is responsible for material softness(4).

Usually short and long silicone soft liners usually become rigid due to the losing of the plasticiser from the denture and this causes the liner to become rigid due to leaching effect of plasticiser and the roughness of this silicone softliners causes the fungal growth and to reduce the shortcomings(5). However, a material suitable as a permanent soft liner was introduced in 1989 following extensive NIH-supported research and clinical trials. This soft liner material uses a polyphosphazene fluoroelastomer (PNF, a polymer with –[–P=N–]– as the main chain, and fluorocarbon side groups (6). PNF forms an interpenetrating network with di- and trifunctional cross-linking acrylics, formulated with barium sulfate filler for radiopacity. The liner material is compression molded in the laboratory, polymerized in hot water, and bonded to new or existing acrylic denture bases(7). It has no plasticizers that can leach out of the liner surface. Therefore, the liner stays soft permanently, provides comfort by absorbing chewing forces due to its high-energy damping, is nonporous to resist fungus growth, and is easily adjusted to customize fit.

Materials and methods:

Sample Preparation

A total of 10 disc-shaped samples of commercially available soft tissue liners were fabricated for this study. Each disc measured 10 mm in diameter and 4 mm in thickness, prepared using a standardized stainless steel mold to ensure dimensional consistency.

Baseline Surface Roughness Measurement

The initial (pre-immersion) surface roughness of all 10 samples was measured using a Mitutoyo SJ-310 Stylus Profilometer, which employed a 2 µm / 60° conical stylus for high-resolution surface characterization. The profilometer was calibrated prior to measurement, and surface roughness values were recorded in micrometers (µm) using the Ra parameter (arithmetical mean roughness). Each sample was scanned at three different points, and the mean value was calculated for each disc to obtain consistent baseline data.

Immersion Protocol

Following baseline measurements, the 10 samples were randomly divided into two groups:

- Group 1: Samples immersed in commercially available grape juice
- Group 2: Samples immersed in lemon juice

Each group consisted of five samples. All samples were completely submerged in 50 mL of the respective solutions and stored at room temperature (approximately 25°C) for a duration of 7 days (1 week). To maintain solution potency, the immersion liquids were refreshed every 24 hours.

Post-Immersion Surface Roughness Measurement

After the 7-day immersion period, samples were removed, gently rinsed with distilled water, air-dried, and then re-evaluated using the same stylus profilometer under identical settings. Post-immersion surface roughness was measured at the same three surface points per disc, and the mean Ra values were recorded.

Data Analysis

All surface roughness values (pre- and post-immersion) were compiled and tabulated. The data were then statistically analyzed using IBM SPSS Statistics software, version 26.0. Descriptive statistics were computed to determine the mean and standard deviation of surface roughness in each group. Comparative analysis was performed using paired t-tests or independent t-tests (as appropriate) to assess the significance of surface roughness changes within and between the two groups. A p-value < 0.05 was considered statistically significant.

Result

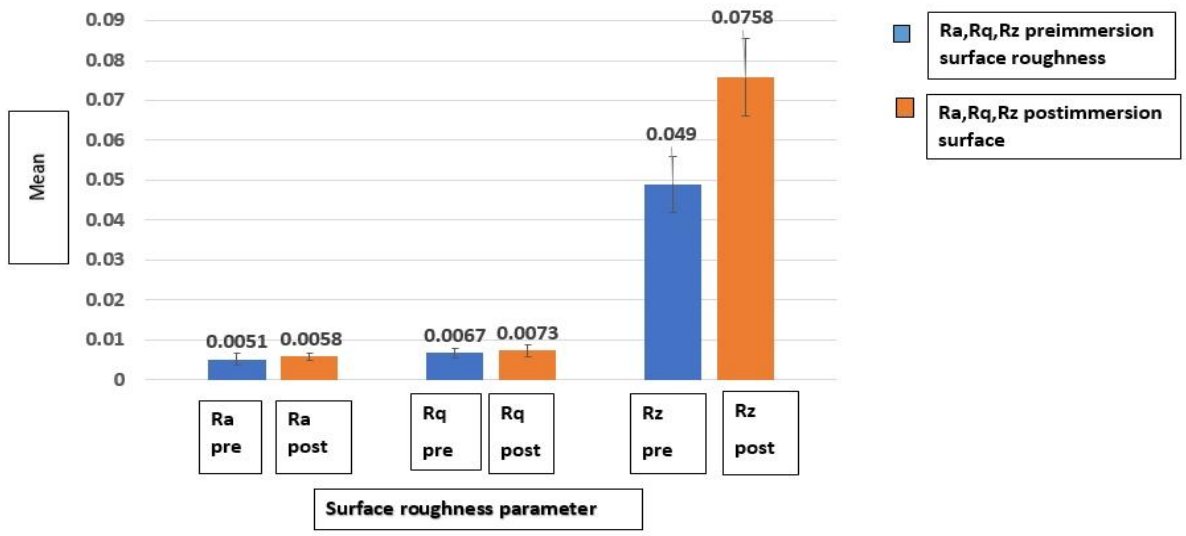

Figure 1: Figure 1 showing surface roughness parameter of pre and post immersion of lemon juice and the grape juice

Table 1:This table represents the mean, standard deviation and significance values between the groups

Sample	Group	Roughness parameter	mean	Std.deviation	Std .error Mean	significance
Lemon juice	Pre Immersion	Ra	0.051	0.01449	0.000458	0.312
		Rq	0.0670	0.001160	0.000367	0.413
		Rz	0.0490	0.007071	0.002236	0.313
	post immersion	Ra	0.0580	0.3421	0.091	0.542
		Rq	0.00730	0.5421	0.094	0.432
		Rz	0.7580	0.3120	0.097	0.672
Grape juice	preimmersion	Ra	0.00700	0.00055	0.00054	0.054
		Rq	0.00600	0.00045	0.00067	0.0052
		Rz	0.0045	0.0012	0.0042	0.0065

	Postimmersion	Ra	0.00032	0.00045	0.0064	0.0053
		Rq	0.00037	0.00076	0.00063	0.0054
		Rz	0.00045	0.00087	0.00063	0.0075

From the Figure 1 lemon juice(denoted as orange) Shown to have more surface roughness than grape juice from our studies and in the previous studies(8) showed determined the ph determine the cytotoxic effect and biocompatible properties of the soft liners and in our study we considered the previous study determining factor ph and selected the fresh quice of lemon and grape of the ph of 2 and 4 respectively and we made 10 sample of soft tissue liners discs was made with the diameter of 10mm and thickness of 4mm.2μm/60 stylus was used to measure the surface roughness.

Pre Immersion surface roughness was measured for 10 samples using Mitutoyo SJ-310 Stylus profilometer and all the data are tabulated and then samples are divided into two groups and the group 1 samples are immersed in grape juice and group 2 samples are immersed in lemon juice for 1 week and Then post immersion surface roughness was taken again using mitutoyo SJ-310 Stylus profilometer and all the data are averaged for pre and post immersion and statistically analyzed using spss version 26 and we found that ph of lemon juice increases the surface roughness than the grape juice whereas grape juice smooths the surface of the softlinear and helps in good biocompatible and less cytotoxic and less irritant those which immersed in lemon juice of less ph and we found that ph is a determining factor for change in the characteristic of the material.

Discussion:

Our team has extensive knowledge and research experience that has translated into high quality publication(9)(10)(11)(12)(13)(14)(15)(16)(17)(18)(19)(20)(21)(22)(23)(24)(25)(26)(27)(28)

In our study we found that immersion with lemon juice increases the surface roughness of the softliners due to PH of fruit juices and PH influences on surface roughness of the softliners.

In a study done by sneha kannan et al the surface roughness of soft-tissue liners is reduced to a minimal extent after brushing simulation. Thus brushing simulation with fluoridated and herbal toothpaste did not influence the important surface roughness property of soft-tissue liners(29).

In a study done by Gowtham Neppala et al Ocimum sanctum extract in denture soft liner showed considerable antimicrobial efficacy in groups in Streptococcus mutans, Candida and minimum efficacy in lactobacillus(30)

In another study they have effect of alcoholic beverages on softliners they have divided the alcoholic beverages into three groups(beer,wine,whiskey) in which the whiskey exhibited highest post surface roughness than the other alcoholic beverage(31) and In another study the materials used are GCof: Instant coffee (Nescafe, Nestle, Araras, SP, Brazil) – prepared according to manufacturer's instruction. GJui: Light artificial juice powder, lemon flavored (Clight, Mondelez , SP, Brazil) – prepared according to manufacturer's instruction; GChl: 0.12% Chlorhexidine gluconate (PerioGard, ColgatePalmolive, Sao Paulo, SP, Brazil); GWine: Red table wine (San Tomé, Alberto Belesso, Itupeva, SP, Brazil); GCola: Cola-based soft drink (Coca-Cola; FEMSA, Jacarei, SP, Brazil); GVin: White wine vinegar (Castelo, Castelo Foods, Jundiai, SP, Brazil); GAnt: Oral antiseptic with fluoride, mint flavored, without alcohol (Colgate Plax Soft Milk, Colgate-Palmolive, SP, Sao Paulo, Brazil); GAntAlc: Oral antiseptic mint flavored, with alcohol (Listerine, Johnson & Johnson, Sao Paulo, SP, Brazil) and The greatest difference in microhardness occurred in the groups of chlorhexidine and antiseptic without alcohol, and the lowest difference in the cola-based soft drink and There was an increase in roughness between the initial period and after submersion of test specimens in the test products; and there was no difference in roughness among the groups(32)

CONCLUSION:

From the above study we concluded that ph is responsible for the surface roughness of the softliners so in our study lemon juice made the soft liner more roughness than the grape juice

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CONFLICT OF INTEREST:

The author declares that there was no conflict of interest in the present study.

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