Evaluation of olive oil as a separating medium and its effect on some physical properties of processed acrylic resin denture base (A comparative study). Part one

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ABSTRACT

Back ground: During acrylic resin processing, the mold must be separated from the surface of the gypsum to prevent liquid resin from penetrating into the gypsum, and water from the gypsum seeping into the acrylic resin. For many years, tin foil was the most acceptable separating medium, and because it's difficult to apply, a tin-foil substitute is used. In this study, olive oil is used as an alternative to tin foil separating medium for first time, so the aim of the study was to evaluate its effect as a separating medium on some physical properties such as (surface roughness, water sorption and solubility) of acrylic resins denture base comparing it with those processed using tin-foil and tin foil substitute such as (cold mold seal) separating medium.

Materials and methods: One hundred forty two acrylic resins samples (124) were prepared falling in two main groups: [heat and cold-cured acrylic denture base resins], for each group three types of separating medium were used and five tests (10 samples) for each test were carried out , and (4) samples for the chemical composition.

Result: From the result obtained, tin foil is one of the most satisfactory separating media in getting the best properties when using it as a separating medium, while, a statistically no-significant difference have been noticed between olive oil and cold-mold seal samples concerning physical and mechanical properties of tested groups. Infrared spectroscopy analysis showed that, no changes were found in the chemical composition of both heat and cold-cured acrylic resins denture base after using olive oil as a separating medium.

Conclusion: Lastly, from the results of this study it may be concluded, that olive oil may be used as a substitute for tin foil and cold – mold seal separating medium in processing both heat and cold – cure acrylic resin denture base.

Key words: Acrylic resin, separating medium, olive oil physical properties. (J Bagh Coll Dentistry 2015; 27(3):40-49).

INTRODUCTION

Separating medium is a coating applied to a surface serving to prevent a second surface from adhering to the first, or a material, usually applied on an impression to facilitate removal of the cast [(1)] .If the surface of the mold is not coated with a separating material, it will be found, that a layer of gypsum impregnated with polymer remains attached to the surface of the denture and is extremely difficult to remove [(2)]. Then it is an improperly contoured, and hence it leads to produces an unaesthetic and poorly fitting denture base [(3)]. Therefore; separating medium must be applied to the surface of the mold. Many authors consider that tin foil is the best separating medium, however it is difficult to apply, tedious, and time-consuming. As a result, the solution is sometimes referred to as a tin foil substitute have been developed [(4)].

A tin foil substitute is a film forming material that is painted on the mold surface thus preventing absorption the liquid acrylic denture base resin and at the same time sealing pores of the artificial stone [(5)].

Nowadays, tin foil substitute can be used successfully if all wax residue is carefully cleaned from the pores of the stone and the tin foil substitute is carefully applied [(3)].A variety of materials can be used as a tin foil substitute, the most popular of separating agents are water-soluble alginates which produce a very fine film on the applied surface [(6)].

This study was designed to evaluate olive oil as a separating medium and its effect on some physical and mechanical properties of the processed acrylic resin denture base when compared to those processed with tin foil and alginate mold seal (cold-mold seal) separating media.

MATERIALS AND METHODS

Metal Pattern Preparation

Two different metal patterns were constructed with four dimensions to save time and effort (Figure 1). Dimensions and shape of each metal pattern were made according to the required tests.

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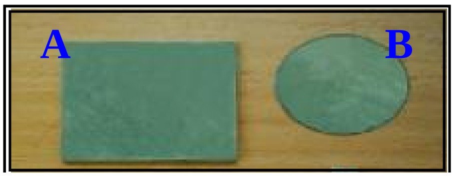

Figure 1: Metal Patterns. A- Surface roughness test, B- Water sorption, Solubility and infrared spectroscopy tests.

Samples grouping

A total of 124 samples were prepared and used during this study. The samples were divided into (2) groups (according to the types of acrylic resin). Each group consisted of (62) samples, and these (122) samples were subdivided according to the types of separating medium used in curing process. These separating media were of (21) samples from tin foil, (20) samples from cold-mold seal, (21) samples from olive oil. And each separating medium were subdivided (according to the tests) used in this study, (10) samples were made for each of the following tests except (4) samples for testing the chemical composition.

1- (10) Samples for surface roughness.
2- (10) Samples for water sorption and solubility.
3- (4) Samples for chemical composition

During preparation of the mold, the conventional flasking technique was followed. The lower portion of the dental flask was filled with dental type III stone (Elite model, Italy) mixed according to the manufacturer instructions (i.e./p ratio is 25ml/100g); a layer of stone mix was placed on metal block to avoid trapping of air when inserting the metal block into the stone mix after coating with separating media.

After stone was set, both the stone and metal patterns were coated with separating media. The upper half of the flask was then positioned on top of lower portion and filled with stone, with vibration to get rid of the trapped air. Stone was allowed to harden for 60 minutes before the flask was opened. The metal patterns were invested each time when the samples were to be prepared. The flask was then opened and metal patterns were removed from the mold carefully.

When using the separating medium such as tin-foil (Dentaurum, Pforzhein), it was adapted to the stone surface in each half of the flask, with fingers. While, in case of using cold-mold seal (11b, Switzerland), and olive oil (Al-Ghassuon company Iraq), separating medium, (2cc) of olive oil was measured by using a disposable syringe and applied onto the stone surface in the flask, with a fine brush (no.0) [7]. Pink heat and cold cured acrylic resin (Triplex hot Ivoclar Vivadent, Liechtenstein) was used to fabricate the samples in this study, following the manufacturer's instructions of powder/ liquid ratio by volume.

Heat-cured acrylics were mixed (3:1), while the cold-cured acrylic was (2.5:1) by volume, and then left to reach the dough phase at room temperature (approximately 23°C). After filling the mold with the dough, the flasks were fitted and pressed together in a hydraulic bench press for (5) minutes before polymerization process. Curing was carried out by placing the clamped flask (Hanau engineering Co.USA) in a water bath and processed by heating at 74ºC for about an hour and half. The temperature was then increased to the boiling point for 30 minutes [8].

After completing the curing, the flask was allowed to cool slowly at room temperature for 30 minutes. Followed by, complete cooling of the flask with tap water for 15 minutes before deflasking. The acrylic patterns were then removed from the mold. In case of curing the cold cure acrylic resin, flasks containing the acrylic resin dough were left in a bench press curing it for 2 hours at 23Cº ± 5Cº [9].

An acrylic bur was used to remove all flashes of acrylic followed by 120-grain size sand paper with continuous water-cooling (to prevent over heating) in order to get smooth surface (except the samples that are used for surface roughness test).

Polishing was accomplished using bristle brush and rag wheel with pumice (Steribim plus, Germany) using dental lathe polishing machine (Derotor, Quayle Dental Q.D, England), (low speed, 1500 rpm) till glossy surface was obtained, the final measurements of the samples were obtained using the Vernier (Rostfre; Germany).

Tests Utilized Examine Properties of the Cured Material

Infrared Spectroscopic Analysis

A-<u>Samples preparation</u>

From metal disc (4) samples of both heat and cold-cured acrylic resin (2 for each) were prepared with dimensions of (50 ± 1mm in diameter and 0.5 ± 0.1mm thickness).

B- <u>Test equipment and procedure</u>

One type of infrared spectrophotometer were used (PYe-Unicam Sp3100).This instrument is a double beam spectrophotometer operating in the region (4000-200cm^{-1}) was found to be adequate for the observation of the structures of acrylic resins denture base [10].

Figure 2: Infrared spectrophotometer device

To examine olive oil by this instrument, compressed sample of olive oil between two KBr plates (Potassium Bromide) in a disc holder to spread out as a thin film. This method was called mull technique used in the region of (4000-200cm^{-1}). A second method called thin film technique. This method used different solvents in polarity to dissolve the samples of heat and cold-cured acrylic resins denture base processed against olive oil as a separating media. Toluene solvent, was the mostly used solvent to dissolve these samples [11].

After dissolving all samples with toluene, transfer the mixture into glass petri dishes leaving the mixture of these samples for an overnight thus allowing the solvent toluene to evaporate leaving the remaining materials as a thin film (transmittance thin film), this thin film was tested in the region of (4000-200cm^{-1}).The same procedure was repeated one time for heat and cold-cured acrylic resin denture base only.

Surface Roughness Test

A- <u>Samples preparation</u>

For surface roughness test, 60 samples of both heat and cold-cured acrylic resins denture base (30 for each) were prepared from metal pattern with dimensions of (65x62x64x61) mm. with 3mm. thickness.

<u>Test equipment and procedure</u>

A profilometer device (Talysurf 4, Talyor Hobson, UK, England) used to measure the surface roughness of a sample. The surface of the sample must be very flat, fixed to the horizontal base of the profilometer. This device is supplied with a surface analyzer (sharp stylus) to trace the profile of the surface irregularities and recording all the peaks and recesses characterizing the surface **(Figure 3)**

All samples of surface roughness were not polished after deflasking.

Figure 3: Profilometer device (Surface roughness tester)

Water Sorption Test

A-<u>Samples preparation</u>

From metal disc, 60 samples of both heat and cold-cured acrylic resins denture base (30 for each) were prepared with dimensions of (50 ± 1mm in diameter and 0.5 ± 0.1 mm in thickness) [8].

B- <u>Test equipment and procedure</u>

The samples were dried in a desiccator containing silica gel (China) **(Figure4: A).** The desiccator was stored in an incubator(Gllenbamp, England) at a temperature of 37ºC ± 2ºC for 24 hours, removed to similar desiccator at room temperature for one hour, after which the samples were weighed using a digital balance (HR-200, A&D company Limited, International Division). **(figure4: B)**. This cycle was repeated until the weight loss of each disk was not more than 0.5 mg in every 24 hour period; this was considered as condition mass .The samples were then immersed in distilled water (Al-Mansour Co. Iraq) at 37ºC ±1ºC. For 7 days. After that the samples were removed from the water with tweezers, wiped by a clean dry hand towel, until free from visible moisture, waved in the air for 15 seconds and weighed one minute after removed from the water. The value for water sorption was calculated for each disc in (mg/cm^2) [8].

$$\text{Water sorption (mg/cm}^2) = \frac{\text{Mass after immersion (mg)} - \text{Conditioned mass (mg)}}{\text{Surface area (cm}^2)}$$

Figure 4: A-Samples drying in desiccators over silica gel. B- Digital balance

Solubility Test

After the final weighing were described in the water sorption test, the samples were reconditioned to constant weight in the desiccator at 37ºC ± 2ºC as was done in the water sorption test previously. The value of solubility was determined for each sample according to the equation below:

$$\text{Solubility (mg/cm}^2\text{)} = \frac{\text{Conditioned mass (mg) - Reconditioned mass (mg)}}{\text{Surface area (cm}^2\text{)}}$$

Statistical analysis

The usual statistical methods were used in this study to analyze and assess our results , included Descriptive statistics:(Arithmetic mean, Standard deviation (S.D.), Minimum, Maximum, Graphical representation by Bar-Chart)and Inferential statistics (One way analysis of variance (ANOVA), LSD (Least Significant Difference Test).

RESULTS

Descriptive and inferential statistics of some physical properties such as (surface roughness, water sorption and solubility) of heat and cold-cured acrylic resins denture base samples which are invested in stone mold as influenced by different types of separating media (tin foil, cold-mold seal, and olive oil), and a comparison between the results of them all to evaluate the olive oil as a separating medium.

Infrared spectroscopy is used to examine the chemical composition changes of heat and cold-cured acrylic resins denture base when using olive oil as a separating media.

Infrared Spectroscopy Analysis

Table (1) shows, the spectral data of acrylic resin denture base after processed against olive oil as a separating medium, acrylic resin denture base, and olive oil. The results shows that there are some bands presented or has disappeared in spectra which can help in the identifications of three samples of (acrylic resin denture base after processed against olive oil as a separating media, acrylic resin denture base, and olive oil)as in **(Figure 5)** and **(Figure 6).** By the assignment of bands for three samples, it seems that, the same bonds in acrylic resin denture base, and olive oil structures. While there are many bonds has just appeared in spectrum of acrylic resin denture base and does not appear in spectrum of olive oil. And also there is a single mode which appears in spectrum of olive oil and cannot be seen in spectrum of acrylic resin denture base, and acrylic resin denture base processed against olive oil as a separating medium which assign to the deformation and rocking modes **(Table 1).**

This evidence is to prove that olive oil is not grafted in acrylic resin denture base through the two processes heat and cold-cured acrylic resins denture base samples [10,12].

Table 1: Infrared assignment of acrylic resin denture base when processed against olive oil as a separating medium, acrylic resin denture base, and olive oil

Assignment	Olive oil wave no.cm^{-1}	Acrylic resin wave no. cm^{-1}	Acrylic processed against olive oil wave no.cm^{-1}
-OH(stretching)	-	3480(m.)	3440(m)
$-CH_2$(stretching)	3080(m.)	3040(v.s.)	3040(v.s.)
-CH(stretching)	-	3000(v.s.)	3000(v.s.)
$-CH_2$(stretching) (CH_3 stretch olive oil)	2980(v.s.)	2980(v.s.)	2980(v.s.)
$-CH_2$(stretching)	2880(s.)	2880(s.)	2885(v.s.sh.)
C=O(stretching)	1750(s.)	1750(v.s.)	1750(v.s.)
C=C(stretching)	-	1650(m.)	1680(s.sh.)
$=CH_2$(deformation)	-	1500-1440(v.s.)	1500-1480(v.s.)
$-CH_3$(deformation)	1470(m.)	-	-
$-CH_3$(deformation)	1460(w.sh.)	-	-
-OH(deformation)	-	1400(s.)	1420(v.s.)
-OH(deformation)	-	1300(v.s.)	1300(v.s.)
C-O(deformation)	1210(m.sh.)	1220(v.s.)	1200(v.s.)
$-CH_3$(deformation)	1180	-	-
$-CH_2$(deformation)	1120	-	-
$=CH_2$ (rocking)	-	1080(s.)	1060(s.)
-CH (wagging)	-	1000(w.sh.)	1000(m.sh.)
$=CH_2$ (wagging)	-	940(w.)	950(m.)
$-CH_3$ (rocking)	900(w.)	-	-
$=CH_2$ (rocking)	-	850(w.)	850(m.)
C=O(deformation)	750(w.)	760(m.)	740(m.)

m = medium, s = strong, w = weak, v = very shoulder

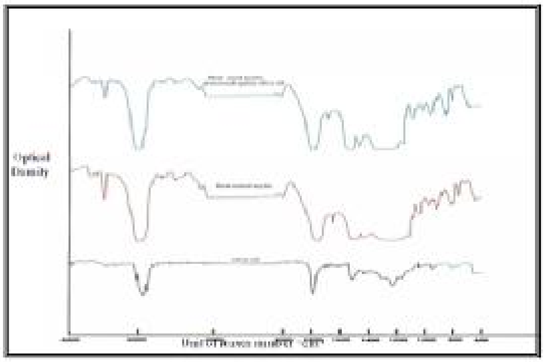

Figure 5: Infrared spectra of olive oil, heat-cured acrylic resin, and heat-cured acrylic resin processed against olive oil as a separating media

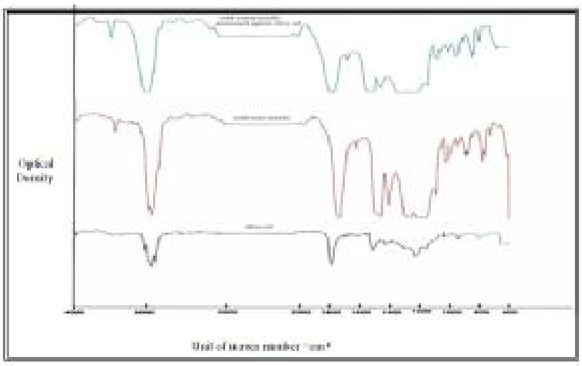

Figure 6: Infrared spectra of olive oil, cold-cured acrylic resin, and cold-cured acrylic resin processed against olive oil as a separating media

Surface Roughness Test Result

Mean values, standard deviation (SD) and standard error (SE) are presented in **(Table 2)** and **(Figure7)** for surface roughness test.

The values of surface roughness varied according to the types of separating medium that are used. The highest mean surface roughness value was obtained in heat-cured acrylic resin denture base and cold-mold seal separating media (0.0289), while the lowest mean surface roughness value was obtained in heat-cured acrylic resin denture base and tin-foil separating media (control group) (0.0166).

Table (3) represents one way ANOVA by LSD multiple comparison test; showed that there was a significant difference at (P<0.05) between different types of separating medium except for a non-significant difference at (P>0.05) between heat-cured acrylic resin-tin foil separating media (control group) and cold-cured acrylic resin-tin foil separating media. Heat-cured acrylic resin-cold mold seal separating media and heat-cured acrylic resin-olive oil separating media, cold-cured acrylic resin-cold mold seal separating media, cold-cured acrylic resin-olive oil separating media,. Heat-cured acrylic resin-olive oil separating media and cold-cured acrylic resin-cold resin -mold seal separating media, cold-cured acrylic resin-olive oil separating media. Cold-cured acrylic resin –cold mold seal separating media and cold –cured acrylic resin –olive oil separating media.

Table 2: Mean and standard deviation, standard errors for surface roughness of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

Statistics	Heat-cured acrylic			Cold-cured acrylic		
	*T.F. control	**C.M.S	***O.O	T.F	C.M.S	O.O
No.	10	10	10	10	10	10
Mean	0.0166	0.0289	0.0269	0.0186	0.0279	0.0273
SD	0.00467143	0.00409471	0.00395671	0.00512510	0.00310734	0.00290784
SE	0.00148	0.00129	0.00125	0.00162	0.000983	0.000920

*** T.F= Tin-FOIL, ** C.M.S= Cold- Mold Seal, ***O.O= Olive Oil**

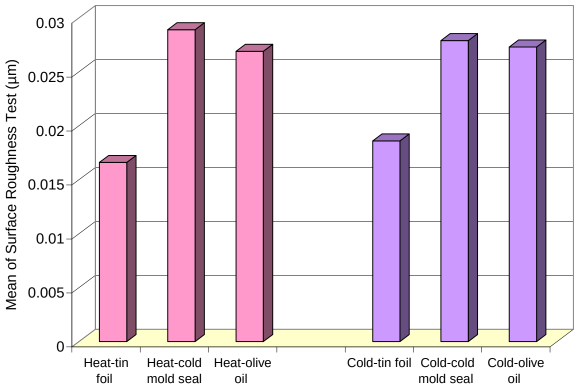

Figure 7: Bar chart show mean values for surface roughness (µm) of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

Table 3: ANOVA then LSD least significant difference for surface roughness of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

ANOVA=S

Groups		Heat-cured acrylic			Cold-cured acrylic		
		*T.F. control	**C.M.S	***O.O	T.F	C.M.S	O.O
Heat-cured acrylic	T.F.		S	S	N.S	S	S
	C.M.S			N.S	S	N.S	N.S
	O.O				S	N.S	N.S
Cold-cured acrylic	T.F					S	S
	C.M.S						N.S
	O.O						

P<0.05 = S= Significant, P>0.05= N.S.=Non Significant, * T.F= Tin Foil, ** C.M.S= Cold-Mold Seal , * O.O= Olive Oil**

Water Sorption Test Result

Mean values, standard deviation (SD) and standard error (SE) are presented in (**table 4)** and (**figure8)** for water sorption test. The values of water sorption varied according to the types of separating medium that are used. The highest mean water sorption value was obtained in cold-cured acrylic resin denture base and olive oil separating media (0.641100), while the lowest mean water sorption value was obtained in heat-cured acrylic resin denture base and tin-foil separating media (control group) (0.518200).

Table (5) represents one way ANOVA by LSD multiple compression test, showed that there was a significant difference at (P<0.05) between different types of separating medium, except for a non-significant difference at (P>0.05) between heat-cured acrylic resin-tin foil separating media (control group) and cold-cured acrylic resin tin-foil separating media. Cold-cured acrylic resin-cold mold seal separating media and cold-cured acrylic resin-olive oil separating media.

Table 4: Mean and standard deviation, standard errors for water sorption of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

Statistics	Heat-cured acrylic			Cold-cured acrylic		
	*T.F. control	**C.M.S	***O.O	T.F	C.M.S	O.O
No.	10	10	10	10	10	10
Mean	0.518200	0.547600	0.587500	0.521600	0.628900	0.641100
SD	0.00451664	0.00894676	0.00990230	0.00656929	0.0220480	0.0341742
SE	0.00143	0.00283	0.00313	0.00208	0.00697	0.0108

***T.F= Tin-Foil, **C.M.S= Cold-Mold Seal, ***O.O= Olive Oil**

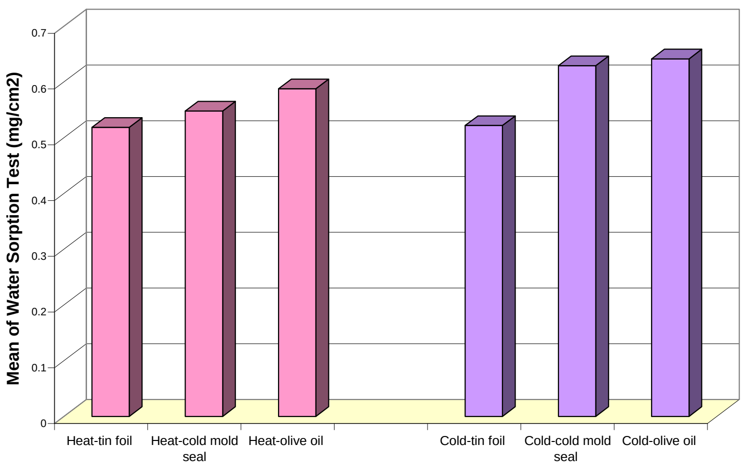

Figure 8: Bar chart show mean values for water sorption (mg/cm^2) of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

Table 5: ANOVA then LSD least significant difference for water sorption of heat and cold-cured acrylic resins denture base as influenced by different types of separating media

ANOVA=S

Groups		Heat-cured acrylic			Cold-cured acrylic		
		*T.F. control	**C.M.S	***O.O	T.F	C.M.S	O.O
Heat-cured acrylic	T.F.		S	S	N.S	S	S
	C.M.S			S	S	S	S
	O.O				S	S	S
Cold-cured acrylic	T.F					S	S
	C.M.S						N.S
	O.O						

P<0.05 = S= Significant, P>0.05= N.S=Non Significant, *T.F.= Tin Foil, **C.M.S= Cold-Mold Seal, ***O.O= Olive Oil

Solubility Test Results

Mean values, standard deviation (SD) and standard error (SE) are presented in (**table 6)** and **(figure9)** for solubility test. The values of solubility varied according to the types of separating medium that are used. The highest mean solubility value was obtained in cold-cured acrylic resin denture base and olive oil separating media (0.0527), while the lowest mean solubility value was obtained in heat-cured acrylic resin denture base and tin-foil separating media (control group) (0.0209).

Table (7) represents one way ANOVA by LSD multiple compression test, showed that there was a significant difference at (P<0.05) between different types of separating medium, except for a non-significant difference at (P>0.05) between heat-cured acrylic resin-cold mold seal separating media and heat-cured acrylic resin-olive oil separating media. Cold-cured acrylic resin-cold mold seal separating media and cold-cured acrylic resin-olive oil separating media.

Table 6: Mean and standard deviation, standard errors for solubility of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

Statistics	Heat-cured acrylic			Cold-cured acrylic		
	*T.F. control	**C.M.S	***O.O	T.F	C.M.S	O.O
No.	10	10	10	10	10	10
Mean	0.0209	0.0277	0.0289	0.0428	0.0501	0.0527
SD	0.000598517	0.00191207	0.00272374	0.00101784	0.00225920	0.00148507
SE	0.000189	0.000605	0.000861	0.000322	0.000714	0.000470

***T.F= Tin-Foil, **C.M.S= Cold -Mold Seal, ***O.O= Olive Oil**

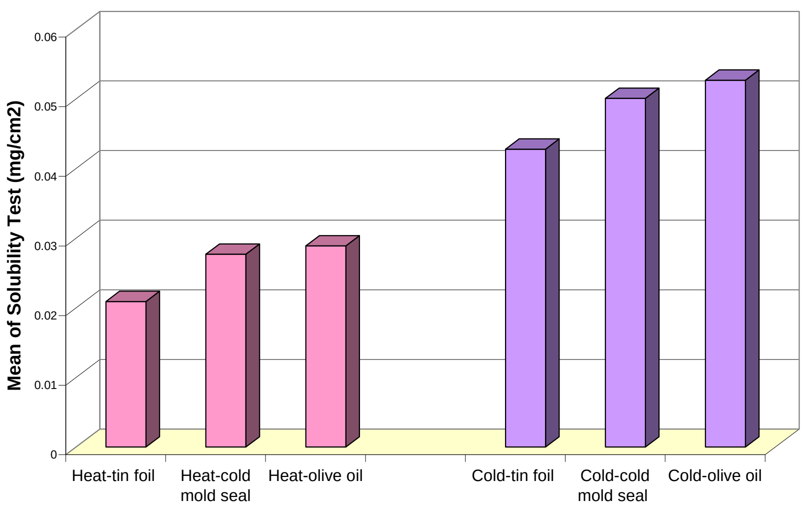

Figure 9: Bar chart show mean values for solubility (mg/cm^2) of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

Table 7: ANOVA then LSD Least significant difference for solubility test of heat and cold-cured acrylic resins denture base as influenced by different types of separating media.

ANOVA=S

Groups		Heat-cured acrylic			Cold-cured acrylic		
		*T.F. control	**C.M.S	***O.O	T.F	C.M.S	O.O
Heat-cured acrylic	T.F.		S	S	S	S	S
	C.M.S			N.S	S	S	S
	O.O				S	S	S
Cold-cured acrylic	T.F					S	S
	C.M.S						N.S
	O.O						

P<0.05 = S= Significant, P>0.05= N.S=Non Significant, *T.F= Tin Foil, **C.M.S= Cold-Mold Seal, ***O.O= Olive Oil

DISCUSSION

Among other factors coefficients, separating medium must be used, due to its effect on the physical properties of the processed acrylic denture base materials. In this study, olive oil is used as a separating medium in the process of curing both heat and cold-cured acrylic resins denture base.

Infra-red Spectroscopy Analysis

From the infrared spectroscopic analysis of the different materials used in this study, including (acrylic resins denture base processed against olive oil as a separating medium, acrylic resins denture base only, and olive oil), showed no differences in the spectrum of the composition of both heat and cold-cured acrylic resins denture base after processing in stone mold lined with olive oil separating media with no changes in the bonds, no additional bonds of olive oil in the processed acrylic resins denture base are detected, that means no reaction between olive oil and acrylic resin denture base (heat and cold) , no grafting of olive oil in heat and cold-cured acrylic resins denture base was found after processing [12].

Surface Roughness

The result of the present study showed that, The highest mean value of surface roughness was obtained in heat-cured acrylic samples lined with cold-mold seal separating media, while olive oil separating media showed less surface roughness compared with cold-mold seal separating medium, also all samples of cold-cured acrylic resin denture base showed similar results of heat-cured acrylic resin denture base, and olive oil showed a comparable result concerning surface roughness**.** This could be related to the lining provided by the tin-foil substitute to make the surface smoother. This agreed with Zani and Vieira [13]. Other explanation can be related to soaking gypsum dies or casts in different oils that makes the surface smooth. This is in agreement with other researches [4,7]. A statistically no-significant difference between cold-mold seal and olive oil separating medium.

While a significant difference was found between tin foil and cold-mold seal separating media on one hand, tin foil and olive oil separating media on the other hand for both heat and cold-cured acrylic resins denture base. This could be due to the bleaching or the clouding which is related to the penetration of the outer layers of resin by molecules of water. This finding is in agreement with many findings [7,14,15].They stated that examination of the specimens revealed that acrylic resin when processed against tin foil substitute showed blanching and fogging and in some cases adherence of plaster particles. Other explanation could be related to the fact alginate film is not completely water-repellent; the cured denture base resin may show some slight opacity. In addition, the alginate films cause stresses with the surface of the denture and this may lead subsequently to crazing, this agreed with others [2,6,16,17].

Water Sorption

The result in tested samples of heat- cured acrylic resin denture base processed against tin foil separating media showed lowering in the mean values of water sorption when compared with those samples processed against cold- mold seal and olive oil separating media. This could be related to that, heat- cured materials processed against tin foil are substantially dry at the end of the curing cycle, while those processed against tin foil substitute approach saturation during curing. This result agreed with Fairhurst and Ryge [14].

On the other hand, tested samples of cold-cured acrylic resin denture base showed higher mean values of water sorption when compared with those samples of heat-cured acrylic resin denture base. Similar results were obtained by

Wozniak et al. [18] who pointed out that cold-cured acrylic stained more than heat-cured acrylic, which may be attributed to the greater porosity of cold-cured acrylic resulting in an increased surface area exposed to solutions. This explanation agreed with Bevan and Earnshow [17] when they recorded the water sorption of (Trevalon) heat and (DetrysSc) cold-cured acrylic as (0.58 and 0.60)mg/cm^2 respectively.

The mean values for water sorption by heat and cold-cured acrylic denture base resins processed against olive oil separating media are within the limits given by ADA [8], the gain in weight by the resin must not be greater than 0.7 mg/cm^2.

Statistically no significant difference was found between samples processed against cold-mold seal separating media and those samples processed against olive oil as a separating media. While a significant difference in water sorption between tested samples for both heat and cold-cured acrylic resins denture base processed against tin foil separating media and those processed against cold-mold seal and olive oil separating media. This may be related to that tin foil substitutes films which are permeable to water allowing it to pass from the gypsum mold and enter the acrylic resin denture base during the process unlike tin foil. This explanation agreed with many researches [7,17,19,20] and disagreement with Fairhurst and Ryge [21]. They pointed that resins processed in mold lined with tin foil substitute separating media is saturated with water during processing and consequently does not absorb more water during storage in it.

Solubility

From tested samples of heat-cured acrylic resin denture base showed lowering in the values of solubility when compared with those samples of cold-cured acrylic resin denture base. This could be related to losing more weight due to lower degree of polymerization of cold-cured acrylic and the presence of higher contents of residual monomer which make higher solubility. This explanation agreed with other findings [4,7,22-24] and olive oil as a separating media showed a comparable result regarding solubility test.

Statistically no significant difference between samples processed against cold-mold seal separating media and those samples processed against olive oil separating media. While there was a significant difference between samples processed against tin foil and cold-mold seal separating media on one hand, tin foil and olive oil separating media on the other hand. This could be related to the degree of sealing supplied by each separating media provided. This result agreed with Sweeney [25] who found that, heat-cured denture base resin specimens prepared in mold lined with tin foil lost less weight on drying than the specimens prepared in molds lined with alginate separating medium. Several workers observed similar results [14,17].

As conclusions;

1- Tin foil is the most ideal type of separating medium for lining molds during the process of both heat and cold-cured acrylic resins followed by olive oil and cold-mold seal separating medium regarding surface roughness, water sorption, solubility
2- Infrared spectroscopic analysis shows no changes in the composition of the processed both heat and cold-cured acrylic resins denture base against olive oil separating medium.
3- Comparable results were found between cold-mold seal and olive oil separating medium regarding (surface roughness, water sorption, solubility) of processed acrylic resins denture base.
4- Finally, from the results obtained, it can be concluded that olive oil forms a satisfactory material for being used as a separating medium of process acrylic resins denture base.

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الخلاصة

من ناحية ودخول الماء خلال عملية بلمرة قاعدة الطقم الاكريلي، يجب فصل سطح القالب من الجبس لمنع سائل الاكريل من اختراق القالب الجبسي من ناحية ثانية من القالب الجبسي الى قاعدة الطقم الاكريلي.منذ عدة سنوات كانت رقائق القصدير المعدنية هي الاكثر استعمالاً كمادة عازلة ولصعوبة استخدامها، تم استعمال بديل رقائق القصدير المعدنية. في هذه الدراسة تم استخدام زيت الزيتون كبديل لرقائق القصدير المعدنية ولأول مرة وتم تقييم هذه المادة وذلك بدراسة تأثيرها كمادة عازلة على بعض الخواص الفيزياوية مثل (خشونة السطح ، خاصية امتصاص الماء ، والذوبان) لقاعدة الطقم الاكريلي الراتنجي ومقارنتها مع تلك المبلمرة بأستعمال رقائق القصدير المعدنية وبديل رقائق القصدير المعدنية (صوديوم ختم القالب) كمواد عازلة.مائتان واربعة واربعون عينة اكريلك (124) موزعة على مجموعتين رئيسيتين (الاكريلك الحار والبارد) وكل مجموعة تحتوي على ثلاثة انواع من المواد العازلة المستعملة في هذه الدراسة كما واجريت اختبارين على كل نوع لكل اختبار تم تجهيز (10) عينات ، ما عدا (4) عينات لفحص التغيير الكيميائي.اظهرت النتائج في هذه الدراسة ان رقائق القصدير المعدنية هي واحدة من اكثر المواد العازلة المفضلة ، وذلك لامكانية الحصول على افضل النتائج عند استخدامها كمادة عازلة ، كما انه لم يكن هنالك اي فروقات احصائية معنوية ملحوظة بين مادة زيت الزيتون وبديل رقائق القصدير المعدنية (صوديوم ختم القالب) فيما يتعلق ببعض الخواص الفيزيائية للمجاميع الاختبارية .اظهرت نتائج تحليل الاشعة تحت الحمراء انه ليس هناك اي تغيير في التركيب الكيميائي لعينات الراتنج الحار والبارد عند استخدام زيت زيتون كمادة عازلة .واخيراً ، فأنه لتوفر زيت الزيتون وسهولة الحصول عليه من الاسواق وكذلك سهولة استخدامه مع الراتنج الاكريلي الحار والبارد كمادة عازلة فأنه يمكن ان يساهم استعمال هذه المادة في التوصل الى نتائج جيدة عند بلمرة الراتنج الاكريلي بنوعيه.