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Table 1. Statistics of the paper review process in iNuSTEC2020

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	Number of submissions received	*: 60 papers*
	Number of submissions accepted	*39 papers*
	Acceptance Rate ((Number of Submissions Accepted) / (Number of Submissions Received)) X 100)	*65% acceptance rate*
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Effects of *Clitoria ternatea linn*. flower juice on the elasticity, texture and pores of the denture retainer component

Effects of *Clitoria ternatea linn.* flower juice on the elasticity, texture and pores of the denture retainer component

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Abstract. *Clitoria ternatea* flower has a variety of antioxidant compounds. To analyze the effects of the flower juice on the elasticity, roughness and pore components of partial denture retainer (stainless steel wire). 0.8 cm of retainer wire components were soaked in the juice (1 g/mL) for 4, 6, and 8 hours at room temperature. Polident and mineral water were used as controls. Measurement of the elasticity, texture and pore of each component based on the addition of wire length, number of pixels, and pores average. *C. ternatea* flower juice showed no statistically significant difference effects among all type solutions on the elasticity, texture and pore of the retainer component. *C. ternatea* flower juice did not cause alteration in the retainer component in terms of elasticity, texture and pore.
Keywords: *Clitoria ternatea*, elasticity, pore and wire, roughness

1. Introduction

*C. ternatea fl*ower contained phenolic compounds, flavonoid, anthocyanin, saponin, alkaloid, and anthocyanidin.[1, 2] Stainless steel wire is most used in prosthodontic and orthodontic treatment due to its content and excellent corrosion resistance in the oral environment [3]. The wire's components was 17-20%, 8-12%, and 0.15% for was chromium, nickel and carbon respectively [4]. It is imperative to find natural materials which through a simple method can be processed as a cleaning solution for the denture retainer. So that maintenance cost of it can be reduced.

1.1. Conceptual framework

Making artificial teeth has the purpose to improve some functions, the functions are mastication, phonetics, and aesthetic. In addition to maintaining the health of tissues in the oral cavity against further damage. There are a variety of dentures one of which is partially removable partial denture. The denture retainer is a partially removable denture component as part of a denture used for the purpose of obtaining stability or denture fixation [5]. Elasticity, texture, and pores of the denture retainer are the essential factors in determining the denture retainer quality and also affects its corrosion behavior, biocompatibility and supporting in the health oral cavity of a user [3], [6]

2. Research Method

2.1. Used materials

Clitoria ternatea (Ct) flower, Stainless steel wire ($_{AISI}$ 302), mineral water, Polident tablet.

2.2. Preparation of Ct flower juice.

Ct flower, harvested in May where growth in Jakarta. Stainless steel wire with 0.8 mm in length. The flower part used was the crown.

After ten of the crowns are washed cleanly, they are immersed in sterile water for 5 minutes. Then the crowns of the flower are squeezed to get 9 mL its juice. The juice was filtered using filter paper and then filtered through milli pores filter (ϕ = 0.22 μm, Sartorius) to prevent contamination of the juice. The final volume of the juice was 8 mL which was divided into four tubes. The tubes were tube I, II, III as a place of wire which soaked in the water for 4, 6, 8 hours and tube C1 as an internal control. There were two other tubes. They were filled the wire which was soaked in Polident solution and mineral water respectively as the positive control (C2) and negative control (C3).

2.3. Test Performed

The elasticity, texture and pore of the wire were performed by accurately observed using optical an microscope . The microscope oriented at 90 degress to the wire surface.[3] All the images were captured at 50x magnification. The elasticity is measured based on the change in the wire length. The measurements were done before and after (4, 6, and 8 hours) immersion. The imaging data of microstructural features of the wire were analyzed further more by ImageJ plugin version 1.46r to obtaian numerical data in the ratio scale [7]. Furthermore, the data were analyzed statistically using repeated ANOVA ($p>0.05$) to find out the difference between treatment and control group data.

3. Results and Discussion

Tabel 1 shows the length of the tested wire before and after soaked in the juice of *C. ternatea* flower on three repetitions of measurements. The duration of immersion time is used base on the length of time a person eats his food in a day (4-6 hours) (the time when removable orthodontic users do not use their wire) and duration of teens and adult human sleep in a day ($\pm$ 8 hours) [8]. While sleeping a removable prosthodontic users does not use the dentures. The measurements are intended to know the elasticity of the wires. We did not calculate their modulus of elasticity. Table 1 shows that no tested wire underwent a lengthy alteration. It describes that the three cleaning solutions did not affect the elasticity of the wire for 8 hours immersion period.

Table 1. The length of the wire before and after soaked in the juice of *C. ternatea* flower.

	Length of the wire (cm) after soaked in the juice			
	0 hour	4 hours	6 hours	8 hours
I	0.800	0.800	0.800	0.800
II	0.800	0.800	0.800	0.800
III	0.800	0.800	0.800	0.800
C2	0.800	0.008	0.800	0.800
C3	0.800	0.800	0.800	0.800

The calculated surface roughness values were; arithmetical mean deviation (Ra), root mean square deviation (Rq), kurtosis of the assessed profile (Rku), skewness of the assessed profile (Rsk), lowest valley (given by the min measurements) (Rv), highest peak (given by the max measurements) (Rp), and the total height of the profile (Rt) [9]. The value of the parameters described the surface texture of the tested wire. All values of the seven parameters of each soaked wire are presented in Tables 2.a. and 2.b. The data in both tables are obtained respectively based on value of Gaussian filtering (GF) and Fast Fourier Transform (FTT) bandpass filtering results.

Table 2. Average roughness parameters of the wire at before and after soaked in the juice; (a) Gaussian Filtering (GF); (b) Fast Fourier Transform (FTT) bandpass filtering.

(a) GF for roughness parameters

	hrs	Ra	Rq	Rku	Rsk	Rv	Rp	Rt
I	0	99.426	100.794	1.117	1.042	60	164	224
	4	99.426	100.794	1.117	1.042	60	164	224
	6	141.258	146.076	1.167	1.068	7.333	255	262.333
	8	153.072	157.939	1.133	1.057	0	245.667	245.667
II	0	130.256	153.874	1.198	1.081	1.333	255	256.333
	4	130.256	153.874	1.198	1.081	1.333	255	256.333
	6	148.784	154.017	1.154	1.064	2	255	257
	8	143.733	149.063	1.146	1.063	0	255	255
III	0	132.797	140.521	1.290	1.117	0	255	255
	4	132.797	140.521	1.290	1.117	0	255	255
	6	136.654	143.123	1.233	1.094	0	255	255
	8	134.411	141.399	1.196	1.084	0	254.667	254.667
C2	0	134.113	139.277	1.171	1.071	0	255	255
	4	134.113	139.277	1.171	1.071	0	255	255
	6	136.654	143.123	1.233	1.094	0	255	255
	8	154.256	160.147	1.158	1.068	0.333	255	255.333
C3	0	98.300	111.766	1.818	1.292	2.684	245.129	247.813
	4	98.300	111.766	1.818	1.292	2.684	245.129	247.813
	6	146.419	151.683	1.140	1.062	0.667	253.667	254.333
	8	135.879	145.675	1.283	1.121	0	255	255

(b) FFT bandpass filtering for roughness parameters

	hrs	Ra	Rq	Rku	Rsk	Rv	Rp	Rt
I	0	0.006	0.046	89.700	9.092	0	1	1
	4	0.006	0.046	89.700	9.092	0	1	1
	6	3.929E-4	0.005	698.496	16.191	0	1	1
	8	0.006	0.046	89.600	9.085	0	1	1
II	0	0.006	0.046	89.700	9.092	0	1	1
	4	0.006	0.046	89.700	9.092	0	1	1
	6	3.929e-4	0.005	698.496	16.191	0	1	1
	8	3.929e-4	0.005	698.496	16.191	0	1	1
III	0	0.006	0.046	89.700	9.092	0	1	1
	4	0.006	0.046	89.700	9.092	0	1	1
	6	3.926e-4	0.005	336.370	14.644	0	1	1
	8	0.006	0.046	89.700	9.092	0	1	1
C2	0	3.926E-4	0.005	336.370	14.644	0	1	1
	4	3.926E-4	0.005	336.370	14.644	0	1	1
	6	3.926E-4	0.005	336.370	14.644	0	1	1
	8	0.006	0.046	89.600	9.085	0	1	1
C3	0	3.929E-4	0.005	698.496	16.191	0	1	1
	4	3.929E-4	0.005	698.496	16.191	0	1	1
	6	3.929E-4	0.005	336.370	14.644	0	1	1
	8	0.006	0.046	89.700	9.092	0	1	1

Table 2 showed the surface roughness parameter data based on Gaussian filtering techniques (sigma value = 5) and Fast Fourier Transform (FFT) with bandpass filter size of 10 x 20 pixels with 178.75 pixels/mm. The homogeneity of Table 2 data did not differ significantly.

The pore diameters of the tested wires at before and after immersed in the three cleaning solutions ranged from 30 to 16 μm. The results of statistic test showed that there is no difference of length,

surface roughness and pore diameter between wires soaked in the juice of flower of Ct, Polident and mineral water significantly.

The gold standard for morphological measurements for the nano-sized component parts is the image of the electron microscope [10]. However, the use of Scanning Electron Microscope for the purpose of measurement began to be abandoned with increasing the ability of optical microscopes and the increasing functionality of plugins on the software to analyze images such as Image J. Our study proves that the images obtained from optical microscopes can show variations of data although statistically not significantly different. It can be seen from the data contained in Table 2.a., and Table 2.b [11]. Ra is a roughness parameter used to control the quality of roughness in general. Ra is easily defined and measured and provides a general description of high variations [12]. Although statistically insignificant, the data in Table 2.a, shows a change in Ra value on wire immersed in Polident and mineral water after 6 and 8 hours of immersion. While the data in Table 2.b, shows that there is a change of Ra value on the wire soaked in Polident and mineral water, after 8 hours of immersion mass.

Rku parameter illustrates the sharpness of the probability density of the amplitude probability density function profile. For Rku in the GF for roughness parameters, if the value is less than three then the distribution curve is said to be platykurtoic which has relatively few high peaks and low valleys [12]. All of Rku values in Table 2.a, data show that the value of all wires at all immersion periods is less than 1. It can be stated that all the wires tested at all periods of immersion in all types of submersion solutions are not found in parts which have relatively much high peaks and low valleys The largest variation in Rku values occurs in the data group of wires immersed in mineral water.

Table 2.b data for the Rv and Rp parameters, show the same value for all the soaked wire each is zero. However in table 2.a the data for both parameters are more varied although not statistically significant. The sum of Rv and Rp parameters values is Rt [12]. So the same thing happens to the value of the Rt parameter. This shows no ‘perforation on all surfaces of the wires after immersion in all periods of immersion.

4. Conclusions

The results of this study proved that Ct flower juice did not cause the alteration in the retainer component in terms of elasticity, texture, and pore. Although the data obtained was the test results performed for 8 hours but enough to be used serve as a scientific base to utilize Ct which is a native Indonesian plant as the main ingredient of a cleaning solution.

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Effects of *Clitoria ternatea linn*. flower juice on the elasticity, texture and pores of the denture retainer component

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Effects of *Clitoria ternatea linn.* flower juice on the elasticity, texture and pores of the denture retainer component

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Abstract. *Clitoria ternatea* flower has a variety of antioxidant compounds. To analyze the effects of the flower juice on the elasticity, roughness and pore components of partial denture retainer (stainless steel wire). 0.8 cm of retainer wire components were soaked in the juice (1 g/mL) for 4, 6, and 8 hours at room temperature. Polident and mineral water were used as controls. Measurement of the elasticity, texture and pore of each component based on the addition of wire length, number of pixels, and pores average. *C. ternatea* flower juice showed no statistically significant difference effects among all type solutions on the elasticity, texture and pore of the retainer component. *C. ternatea* flower juice did not cause alteration in the retainer component in terms of elasticity, texture and pore.
Keywords: *Clitoria ternatea*, elasticity, pore and wire, roughness

1. Introduction

*C. ternatea fl*ower contained phenolic compounds, flavonoid, anthocyanin, saponin, alkaloid, and anthocyanidin.[1, 2] Stainless steel wire is most used in prosthodontic and orthodontic treatment due to its content and excellent corrosion resistance in the oral environment [3]. The wire's components was 17-20%, 8-12%, and 0.15% for was chromium, nickel and carbon respectively [4]. It is imperative to find natural materials which through a simple method can be processed as a cleaning solution for the denture retainer. So that maintenance cost of it can be reduced.

1.1. Conceptual framework

Making artificial teeth has the purpose to improve some functions, the functions are mastication, phonetics, and aesthetic. In addition to maintaining the health of tissues in the oral cavity against further damage. There are a variety of dentures one of which is partially removable partial denture. The denture retainer is a partially removable denture component as part of a denture used for the purpose of obtaining stability or denture fixation [5]. Elasticity, texture, and pores of the denture retainer are the essential factors in determining the denture retainer quality and also affects its corrosion behavior, biocompatibility and supporting in the health oral cavity of a user [3], [6]

2. Research Method

2.1. Used materials

Clitoria ternatea (Ct) flower, Stainless steel wire ($_{AISI}$ 302), mineral water, Polident tablet.

2.2. Preparation of Ct flower juice.

Ct flower, harvested in May where growth in Jakarta. Stainless steel wire with 0.8 mm in length. The flower part used was the crown.

After ten of the crowns are washed cleanly, they are immersed in sterile water for 5 minutes. Then the crowns of the flower are squeezed to get 9 mL its juice. The juice was filtered using filter paper and then filtered through milli pores filter (ϕ = 0.22 µm, Sartorius) to prevent contamination of the juice. The final volume of the juice was 8 mL which was divided into four tubes. The tubes were tube I, II, III as a place of wire which soaked in the water for 4, 6, 8 hours and tube C1 as an internal control. There were two other tubes. They were filled the wire which was soaked in Polident solution and mineral water respectively as the positive control (C2) and negative control (C3).

2.3. Test Performed

The elasticity, texture and pore of the wire were performed by accurately observed using optical an microscope . The microscope oriented at 90 degress to the wire surface.[3] All the images were captured at 50x magnification. The elasticity is measured based on the change in the wire length. The measurements were done before and after (4, 6, and 8 hours) immersion. The imaging data of microstructural features of the wire were analyzed further more by ImageJ plugin version 1.46r to obtaian numerical data in the ratio scale [7]. Furthermore, the data were analyzed statistically using repeated ANOVA ($p>0.05$) to find out the difference between treatment and control group data.

3. Results and Discussion

Tabel 1 shows the length of the tested wire before and after soaked in the juice of *C. ternatea* flower on three repetitions of measurements. The duration of immersion time is used base on the length of time a person eats his food in a day (4-6 hours) (the time when removable orthodontic users do not use their wire) and duration of teens and adult human sleep in a day ($\pm$ 8 hours) [8]. While sleeping a removable prosthodontic users does not use the dentures. The measurements are intended to know the elasticity of the wires. We did not calculate their modulus of elasticity. Table 1 shows that no tested wire underwent a lengthy alteration. It describes that the three cleaning solutions did not affect the elasticity of the wire for 8 hours immersion period.

Table 1. The length of the wire before and after soaked in the juice of *C. ternatea* flower.

	Length of the wire (cm) after soaked in the juice			
	0 hour	4 hours	6 hours	8 hours
I	0.800	0.800	0.800	0.800
II	0.800	0.800	0.800	0.800
III	0.800	0.800	0.800	0.800
C2	0.800	0.008	0.800	0.800
C3	0.800	0.800	0.800	0.800

The calculated surface roughness values were; arithmetical mean deviation (Ra), root mean square deviation (Rq), kurtosis of the assessed profile (Rku), skewness of the assessed profile (Rsk), lowest valley (given by the min measurements) (Rv), highest peak (given by the max measurements) (Rp), and the total height of the profile (Rt) [9]. The value of the parameters described the surface texture of the tested wire. All values of the seven parameters of each soaked wire are presented in Tables 2.a. and 2.b. The data in both tables are obtained respectively based on value of Gaussian filtering (GF) and Fast Fourier Transform (FTT) bandpass filtering results.

Table 2. Average roughness parameters of the wire at before and after soaked in the juice; (a) Gaussian Filtering (GF); (b) Fast Fourier Transform (FTT) bandpass filtering.

(a) GF for roughness parameters

	hrs	Ra	Rq	Rku	Rsk	Rv	Rp	Rt
I	0	99.426	100.794	1.117	1.042	60	164	224
	4	99.426	100.794	1.117	1.042	60	164	224
	6	141.258	146.076	1.167	1.068	7.333	255	262.333
	8	153.072	157.939	1.133	1.057	0	245.667	245.667
II	0	130.256	153.874	1.198	1.081	1.333	255	256.333
	4	130.256	153.874	1.198	1.081	1.333	255	256.333
	6	148.784	154.017	1.154	1.064	2	255	257
	8	143.733	149.063	1.146	1.063	0	255	255
III	0	132.797	140.521	1.290	1.117	0	255	255
	4	132.797	140.521	1.290	1.117	0	255	255
	6	136.654	143.123	1.233	1.094	0	255	255
	8	134.411	141.399	1.196	1.084	0	254.667	254.667
C2	0	134.113	139.277	1.171	1.071	0	255	255
	4	134.113	139.277	1.171	1.071	0	255	255
	6	136.654	143.123	1.233	1.094	0	255	255
	8	154.256	160.147	1.158	1.068	0.333	255	255.333
C3	0	98.300	111.766	1.818	1.292	2.684	245.129	247.813
	4	98.300	111.766	1.818	1.292	2.684	245.129	247.813
	6	146.419	151.683	1.140	1.062	0.667	253.667	254.333
	8	135.879	145.675	1.283	1.121	0	255	255

(b) FFT bandpass filtering for roughness parameters

	hrs	Ra	Rq	Rku	Rsk	Rv	Rp	Rt
I	0	0.006	0.046	89.700	9.092	0	1	1
	4	0.006	0.046	89.700	9.092	0	1	1
	6	3.929E-4	0.005	698.496	16.191	0	1	1
	8	0.006	0.046	89.600	9.085	0	1	1
II	0	0.006	0.046	89.700	9.092	0	1	1
	4	0.006	0.046	89.700	9.092	0	1	1
	6	3.929e-4	0.005	698.496	16.191	0	1	1
	8	3.929e-4	0.005	698.496	16.191	0	1	1
III	0	0.006	0.046	89.700	9.092	0	1	1
	4	0.006	0.046	89.700	9.092	0	1	1
	6	3.926e-4	0.005	336.370	14.644	0	1	1
	8	0.006	0.046	89.700	9.092	0	1	1
C2	0	3.926E-4	0.005	336.370	14.644	0	1	1
	4	3.926E-4	0.005	336.370	14.644	0	1	1
	6	3.926E-4	0.005	336.370	14.644	0	1	1
	8	0.006	0.046	89.600	9.085	0	1	1
C3	0	3.929E-4	0.005	698.496	16.191	0	1	1
	4	3.929E-4	0.005	698.496	16.191	0	1	1
	6	3.929E-4	0.005	336.370	14.644	0	1	1
	8	0.006	0.046	89.700	9.092	0	1	1

Table 2 showed the surface roughness parameter data based on Gaussian filtering techniques (sigma value = 5) and Fast Fourier Transform (FFT) with bandpass filter size of 10 x 20 pixels with 178.75 pixels/mm. The homogeneity of Table 2 data did not differ significantly.

The pore diameters of the tested wires at before and after immersed in the three cleaning solutions ranged from 30 to 16 μm. The results of statistic test showed that there is no difference of length,

surface roughness and pore diameter between wires soaked in the juice of flower of Ct, Polident and mineral water significantly.

The gold standard for morphological measurements for the nano-sized component parts is the image of the electron microscope [10]. However, the use of Scanning Electron Microscope for the purpose of measurement began to be abandoned with increasing the ability of optical microscopes and the increasing functionality of plugins on the software to analyze images such as Image J. Our study proves that the images obtained from optical microscopes can show variations of data although statistically not significantly different. It can be seen from the data contained in Table 2.a., and Table 2.b [11]. Ra is a roughness parameter used to control the quality of roughness in general. Ra is easily defined and measured and provides a general description of high variations [12]. Although statistically insignificant, the data in Table 2.a, shows a change in Ra value on wire immersed in Polident and mineral water after 6 and 8 hours of immersion. While the data in Table 2.b, shows that there is a change of Ra value on the wire soaked in Polident and mineral water, after 8 hours of immersion mass.

Rku parameter illustrates the sharpness of the probability density of the amplitude probability density function profile. For Rku in the GF for roughness parameters, if the value is less than three then the distribution curve is said to be platykurtoic which has relatively few high peaks and low valleys [12]. All of Rku values in Table 2.a, data show that the value of all wires at all immersion periods is less than 1. It can be stated that all the wires tested at all periods of immersion in all types of submersion solutions are not found in parts which have relatively much high peaks and low valleys The largest variation in Rku values occurs in the data group of wires immersed in mineral water.

Table 2.b data for the Rv and Rp parameters, show the same value for all the soaked wire each is zero. However in table 2.a the data for both parameters are more varied although not statistically significant. The sum of Rv and Rp parameters values is Rt [12]. So the same thing happens to the value of the Rt parameter. This shows no ‘perforation on all surfaces of the wires after immersion in all periods of immersion.

4. Conclusions

The results of this study proved that Ct flower juice did not cause the alteration in the retainer component in terms of elasticity, texture, and pore. Although the data obtained was the test results performed for 8 hours but enough to be used serve as a scientific base to utilize Ct which is a native Indonesian plant as the main ingredient of a cleaning solution.

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