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Research Article

ASSESSMENT OF EXOGENOUS PIGMENTATION ON CLEAR ELASTOMERIC MODULES - AN IN VITRO STUDY

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A B S T R A C T

Objective: The study comprised of assessment of the in vitro changes in the shade of clear elastomeric modules from different manufacturers influenced by exogeneous pigmentation contained in the everyday dietary substances.
Material and methods: The specimen comprised of clear Elastomeric modules (Group A- Libral, Group B – TP orthodontics) which were immersed in the accompanying dietary substances: ketchup, coffee, tea, pepsi & methylene blue and its hue,saturation and intensity were figured after 72 hrs by methods for Adobe Photoshop CS3 was utilized to mirror the module recolouring seriousness.
Results: Significant difference was found among among the two sorts of modules were analyzed in this study. Ketchup and methylene blue demonstrated higher staining potential when appeared differently in relation to all staining media. Besides, there was no statistically significant difference in staining contrast of tea and Pepsi
Conclusion: Ketchup and methylene blue are strong staining media ought to be avoided by patients opting for aesthetic appliances for their orthodontic treatment. Elastomeric modules manufactured by TP orthodontics indicated to have a greater staining potential as compared to the other company, which could be identified to be related with their manufacturing processing.

INTRODUCTION

The interest for stylish orthodontic appliances has expanded in the treatment of adult patients in orthodontic market.These arrangements incorporate the utilization of ceramic and tooth coloured brackets with clear elastomeric modules as a strategy for wire ligation. One problem that associates itself with the utilization of these elastomeric modules is staining because of the daily consumption of various dietary substances[1,2]. While the ceramic sections are impervious to shading change, orthodontic elastomeric are liable to staining by substances which have a greater potential for colourings, bringing about aesthetics issue [3,4].Patients who look for imperceptibility of orthodontic appliances more often incline toward elastic modules that supplement the great appearance of aesthetic and clear brackets. The staining characteristics of these modules prompted more continuous substitution by the clinicians and in this manner an expansion in the quantity of follow-up visits and chairside time.

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Thus, selecting the most stain resisting modules becomes a priority for clinicians. The staining capability of these elastomeric modules, originate from chemical degradation and mechanical staining. At first, chemical degradation leads to staining of the modules followed by basic mechanical staining over the exposure time to the staining media.[4] The evaluation of staining of elastomeric modules after presentation to dietary substances can be completed utilizing advanced instrumentation, for example, cameras or spectrophotometer.[1,3,5,6] These instruments fail to provide a knowledge into the view of people to the staining and aesthetical assessment of these elastomeric modules. The surface characteristics of the modules play a vital role in staining. The modules exhibiting a higher surface porosity is seen to be related with the staining of these materials .[3]Subsequent attempts to additionally describe the exogenous shading modification of elastomeric modules affected by dietary foods and refreshments, this study evaluated the conceivable colour change of clear elastomeric ligatures as per the different types of food and beverage.

MATERIALS AND METHODS

Clear elastomeric modules from two noteworthy orthodontic companies were analyzed in the review to be specific: LIBRAL, TP ORTHODONTICS. Elastomeric modules from each organization were immersed in a plastic holder containing taking after substances:ketchup, coffee, tea, Pepsi, methylene blue and its hue,saturation, intensity was computed. These containers were kept for 72 hrs and from that point onward, modules were removed, rinsed with two fold distilled water , dried and advanced pictures were taken and afterward handled utilizing commercial programming software Adobe photoshop CS3

Table 1 Setup Used For The Study

RESULTS

Results showed that both brands underwent significant staining when exposed to the dietary substances. The hue of group "A" changed after dipping it in all the solutions, but 'p value significantly changed with methylene blue (p=0.034). Saturation of group A changed significantly with ketchup (p=0.048). Intensity of group A changed with tea (p=0.036). The hue of group B changed with tea (p=0.036) & methylene blue (p=0.002), saturation of group B changed significantly with tea (p=0.003).Intensity of group B changed with ketcup (p=0.978).

Table 1 Comparison of Hue of Module A (Control –Before Staining) & Module A After Staining In Different Solution Like Ketchup, Coffee, Tea, Pepsi, Methylene Blue (Using Paired T Test) Respectively

HUE	Group 1 (Module A – Before Staining) (Mean ± S.D.)	Group 2 [Module A – After Staining] (Mean ± S.D.)	Paired 't' test	p value, Significance
KETCHUP (n=4)	143.25 ± 26.87	24 ±5.45	28.65*	p < 0.001, highly significant
COFFEE (n=4)	143.25 ± 26.87	28 ±9.54	24.13	p < 0.001, highly significant
TEA (n=4)	143.25 ± 26.87	53 ±15.37	18.76	p < 0.001, highly significant
PEPSI (n=4)	143.25 ± 26.87	71 ±16.34	15.29	p < 0.001, highly significant
METHYLENE BLUE (n=4)	143.25 ± 26.87	198 ±41.23	9.87	p = 0.034, significant

Table 2 Comparison of Saturation of Module A (Control – Before Staining) & Module A After Staining In Different Solution Like Ketchup, Coffee, Tea, Pepsi, Methylene Blue (Using Paired T Test) Respectively

Saturation	Group 1 (Module A – Before Staining) (Mean ± S.D.)	Group 2 [Module A – After Staining] (Mean ± S.D.)	Paired 't' test	p value, Significance
KETCHUP (n=4)	16.5 ± 3.89	24 ±5.45	4.87	p = 0.048, significant
COFFEE (n=4)	16.5 ± 3.89	28 ±9.54	13.56	p < 0.001, highly significant
TEA (n=4)	16.5 ± 3.89	53 ±15.37	21.67	p < 0.001, highly significant
PEPSI (n=4)	16.5 ± 3.89	71 ±16.34	25.48	p < 0.001, highly significant
METHYLENE BLUE (n=4)	16.5 ± 3.89	198 ±41.23	38.91*	p < 0.001, highly significant

Table 3 Comparison of Intensity of Module A (Control – Before Staining) & Module A After Staining In Different Solution Like Ketchup, Coffee, Tea,Pepsi,Methylene Blue (Using Paired T Test) Respectively

Intensity	Group 1 (Module A – Before Staining) (Mean ± S.D.)	Group 2 [Module A – After Staining] (Mean ± S.D.)	Paired 't' test	p value, Significance
KETCHUP (n=4)	58 ± 17.87	24 ±5.45	23.13	p < 0.001, highly significant
COFFEE (n=4)	58 ± 17.87	28 ±9.54	18.96	p < 0.001, highly significant
TEA (n=4)	58 ± 17.87	53 ±15.37	5.67	p = 0.036, significant
PEPSI (n=4)	58 ± 17.87	71 ±16.34	9.47	p < 0.001, highly significant
METHYLENE BLUE (n=4)	58 ± 17.87	198 ±41.23	29.46*	p < 0.001, highly significant

Table 4 Comparison of Hue of Module B (Control –Before Staining) & Module B After Staining In Different Solution Like Ketchup, Coffee, Tea, Pepsi, Methylene Blue (Using Paired T Test) Respectively

HUE	Group 1 (Module B – Before Staining) (Mean ± S.D.)	Group 2 [Module B – After Staining] (Mean ± S.D.)	Paired 't' test	p value, Significance
KETCHUP (n=4)	195.5 ± 46.87	44 ± 8.23	24.58*	p < 0.001, highly significant
COFFEE (n=4)	195.5 ± 46.87	45 ±9.54	23.47	p < 0.001, highly significant
TEA (n=4)	195.5 ± 46.87	54 ±15.37	21.06	p = 0.036, significant
PEPSI (n=4)	195.5 ± 46.87	77 ± 17.89	17.36	p < 0.001, highly significant
METHYLENE BLUE (n=4)	195.5 ± 46.87	212 ± 32.12	5.89	p = 0.002, significant

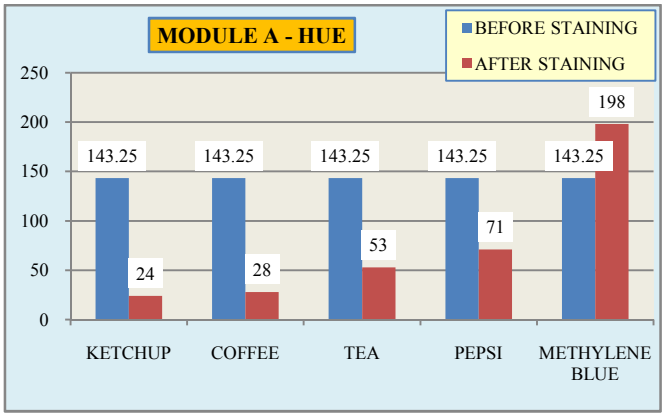
Table 5 Comparison of Saturation of Module B (Control – Before Staining) & Module B After Staining In Different Solution Like Ketchup, Coffee, Tea, Pepsi, Methylene Blue (Using Paired T Test) Respectively

Saturation	Group 1 (Module B –Before Staining) (Mean ± S.D.)	Group 2 [Module B – After Staining] (Mean ± S.D.)	Paired 't' test	p value, Significance
KETCHUP (n=4)	12.5 ± 2.52	32 ± 6.71	12.87	p < 0.001, highly significant

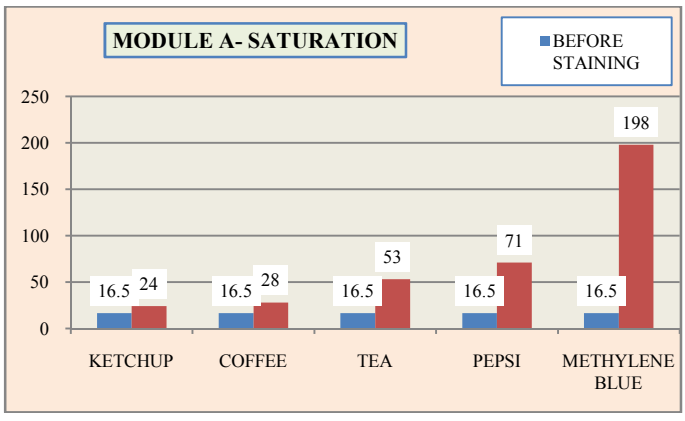
COFFEE (n=4)	12.5 ± 2.52	47 ±5.34	19.34 *	p < 0.001, highly significant
TEA (n=4)	12.5 ± 2.52	17 ±2.13	5.98	p = 0.003, significant
PEPSI (n=4)	12.5 ± 2.52	6.5 ±1.07	16.37	p < 0.001, highly significant
METHYLENE BLUE (n=4)	12.5 ± 2.52	44 ± 2.33	15.1	p < 0.001, highly significant

Table 6 Comparison of Intensity of Module B (Control – Before Staining) & Module B After Staining In Different Solution Like Ketchup, Coffee, Tea, Pepsi, Methylene Blue (Using Paired T Test) Respectively

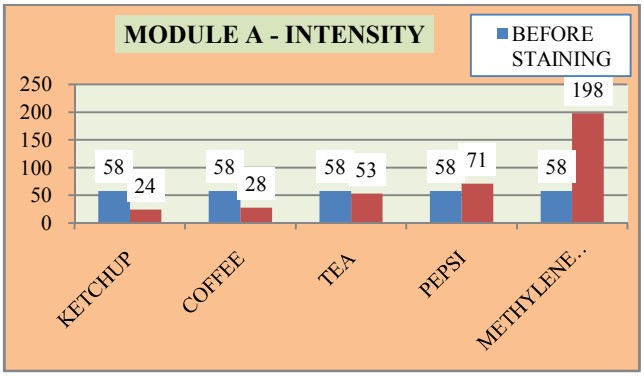
Intensity	Group 1 (Module B – Before Staining) (Mean ± S.D.)	Group 2 [Module B – After Staining] (Mean ± S.D.)	Paired 't' test	p value, Significance
KETCHUP (n=4)	72.75 ± 17.82	72 ± 7.82	0.845*	0.978, not significant
COFFEE (n=4)	72.75 ± 17.82	94 ± 11.43	8.91	0.0012, significant
TEA (n=4)	72.75 ± 17.82	99 ± 14.56	14.76	p < 0.001, highly significant
PEPSI (n=4)	72.75 ± 17.82	99 ± 12.45	14.76	p < 0.001, highly significant
METHYLENE BLUE (n=4)	72.75 ± 17.82	46 ± 7.23	11.32	p = 0.001, significant



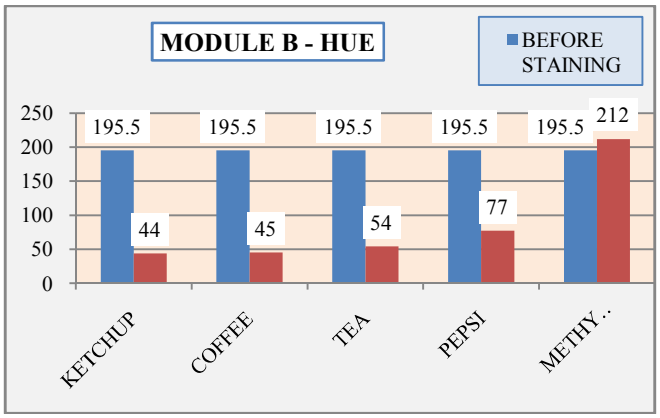
Graph 1



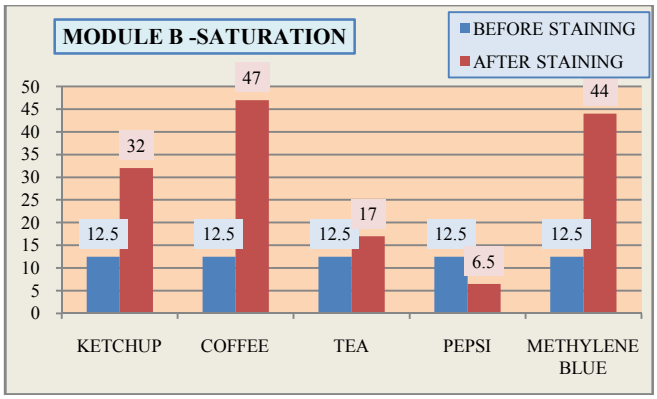
Graph 2



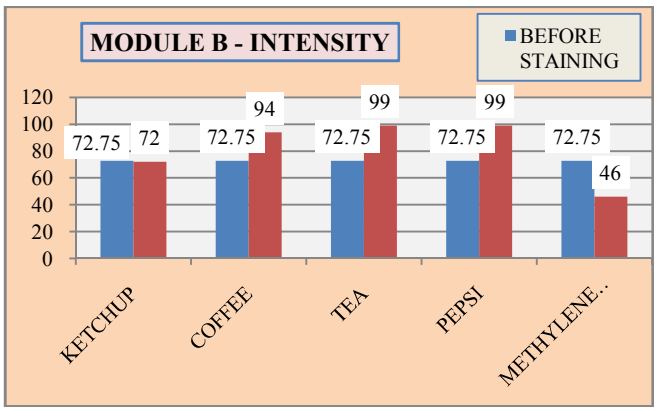
Graph 3



Graph 4



Graph 5



Graph 6

DISCUSSION

Assessment of staining properties of these elastomeric modules is of utmost importance to the orthodontists. It gives them a chance to choose among the helper materials accessible with certainty, that can help serve better to their patient

longing for tasteful arrangements.In addition, the orthodontist would give certain recommendations and better instruction toward the food and drinks to be minimize the staining of the modules during their treatment. Immersion of the food substance for Seventy-two hour is adequate to simulate the clinical interruption and exposure of the elatomeric modules to staining diet substances during the 3 weeks appointment interval.[5,8] The hue, saturation & intensity of group A changed significantly after staining with methylene blue. Hue changed significantly with methylene blue in group B, saturation & intensity changed with coffee & tea. In view of these findings, it is prescribed that orthodontists should advice patients, who opt for the esthetic solutions for their appliances, to limit or maintain a strategic distance from coffee and tea drinking amid treatment.[9] The differences in the clinical optical behaviour among different commercial companies could be related to the manufacturing process of these modules that will lead to different surface porosities and topographical characteristics of elastomeric modules.[5]

After evaluating both the brands of aesthetic elastomericmodules, both of them showed significant staining which appeared to be more pronounced in TP orthodontic modules than Libral.

CONCLUSIONS

1. Methylene blue and coffee are strong staining media that should be avoided by patients who opted to have aesthetic appliances for their orthodontic treatment.
2. Ketchup has significantly higher staining potential when compared to chocolate and energy drinks.
3. Elastomeric modules manufactured by TP ORTHODONTICS showed higher staining optical properties as compared to LIBRAL, which could be related to the manufacturing processing of these modules.

References

1. Fernandes AB, Ribeiro AA, Araujo MV, Ruellas AC. Influence of exogenous pigmentation on the optical properties of orthodontic elastic ligatures. *J Appl Oral Sci.* 2012; 20:462-6.
2. Lew KK. Staining of clear elastomeric modules from certain foods. *J ClinOrthod*. 1990; 24:472-4.
3. Kim SH, Lee YK. Measurement of discolouration of orthodontic elastomeric modules with a digital camera. *Eur J Orthod*. 2009; 31:556-62.
4. Wiltshire W.A., Labuschagne P.W. Staining of light-cured aesthetic resin restorative materials by different staining media: an *in vitro* study. *J. Dent. Assoc. S. Afr.* 1990; 45(12):561-565.
5. Fernandes A.B., Ribeiro A.A., Araujo M.V., Ruellas A.C. Influence of exogenous pigmentation on the optical properties of orthodontic elastic ligatures. *J. Appl. Oral Sci.* 2012; 20(4):462-466. doi: 10.1590/S1678-77572012000400012.
6. Aldrees AM, Al-Foraidi SA, Murayshed MS, Almoammar KA. Color stability and force decay of clear orthodontic elastomeric chains: An *in vitro* study. *IntOrthod*. 2015; 13:287-301.
7. Sung-Hee Kim and Yong-Keun Lee European Journal of Orthodontics 31 (2009) 556-562 Measurement of discolouration of orthodontic elastomeric modules with a digital camera.
8. Andreas Faltermeier *, Michael Behr ** and Dieter Müßig**European Journal of Orthodontics* 29 (2007) 354-358 *In vitro* colour stability of aesthetic brackets.
9. Nabeel F Talic and Abdullazez A Almudhi J OF Orthodontic Science 2016 APR JUN 5(2)77-79 The effect of dietary pigmentation on the esthetic appearance of clear orthodontic elastomeric modules

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