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Evaluation of Refashioned Dental Exquisites- A Comparative Study between Dental Professionals and Laypersons in India

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Abstract:-

➢ ***Introduction***

Smile is the best and the most beautiful way to solve many problems. A perfect smile provides more self-confidence and inspiration to lead a successful life. A Dental professional can easily detect the types of smile discrepancies that outfit one's appearance.

➢ ***Aim***

This study aims to evaluate how well dental professionals and laypersons can detect the discrepancies of a smile.

➢ ***Materials and Methods***

Comparative questionnaire survey was conducted using a Pro-forma which contained demographic data and 20 altered photographs comparison using the one-way analysis of variance (ANOVA) test for comparison between all groups; post hoc test for multiple comparisons between all the groups was also employed.

➢ ***Results***

Laypersons were more critical in identifying the discrepancy in crown width and orthodontist showed a higher threshold level for the unattractive crown length, dentists were found to be more critical in identifying the discrepancies in papillary height and less critical in identifying the midline diastema.

Keywords:- *Exquisites, Smile, Discrepancies.*

I. INTRODUCTION

The term 'Aesthetics' derives from Greek and it meant for beauty (exquisite). There are two dimensions on aesthetics one is objective and the other one is subjective. [1] There is a hierarchy in determining the exquisite perception of an individual which vary from person to person. The face is the dominant factor to determine dental exquisite whereas 34% of eyes and 31% of mouth also plays a major role.[2] The facial look is the most vital to admire and attract the neighbours and also plays an important role during a first impression. Every person desires to appear exquisite and this is achieved and decided by their smile. An ugly smile spoils the will power of the person. This has, indeed, been the quest of orthodontists the world over to provide that ideal makeover for those who are less fortunate and perfectly align their dentition.[3] In some instances, the opinion of dental professionals does not correlate with the prediction of laypersons. It is a known fact that the orthodontist's perception often differs from that of other professionals and laypersons. This fact has already been well established. However, we find that these established parameters have been carried out among the western population. For these parameters to be acceptable for the Indian population, it is necessary to find out whether these smile parameters established for the western population were acceptable for the Indian population as well. [3] Hence, this study is aimed at evaluating the opinion of general dentists and laypersons in addition to orthodontists and also to predict how well they can detect the dental discrepancies.

II. MATERIALS AND METHODS

A comparative questionnaire survey was conducted among 20 -40 years old individuals in Chennai. The samples were divided into 3 groups:
GROUP 1: Laypersons – 50 individuals.
GROUP 2: General dentists –50 individuals.
GROUP 3: Orthodontists – 36 individuals.

The sample size was calculated using the formula and was assigned randomly to each group. Since this is a short study, IRB is not required. The clinical approval was obtained from the Department of Public Health Dentistry, SRM Dental College, Ramapuram, Chennai.

This study Pro-forma contained demographic data along with 20 sets of photographs. The captured photographs contain part of the face restricted to that of chin below and ala of the nose above to decrease the compounding factors. The survey was conducted by personal interview during the period 2011- 2012 in Chennai city.

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The photographs were adopted from the study done by Mayuri Thomas, Rajesh Reddy and B. Jayabharath Reddy on the topic "perception differences of altered dental aesthetics by dental professionals and laypersons".

In the above-mentioned study, the photographs showing the smile of the subjects were captured, while they were in relaxed positions using a digital camera. The photographs were taken at a distance of 60 cm away from the subject. The captured photographs contain part of the face restricted to that of chin below and ala of the nose above to decrease the compounding factors. There was no zooming done. The images were altered following four aesthetic parameters based on Kokich's approach:

- Length of the crown
- Width of the crown
- Midline diastema
- Papillary height

The three above groups rated each of the four aesthetic parameters mentioned earlier, where each aesthetic parameter consisted of five variants that were morphed using the Adobe Photoshop. Each smile was intentionally altered for all those parameters, which were most common in anterior aesthetic discrepancies that also depend on the clinical importance and their frequency related with a smile.

The length of the crown of the upper central incisor was refashioned and reduced to 0.5 mm by altering the gingival margin level. Then the alteration of crown width was done to a lateral incisor, as it is the most common tooth, which is affected by the size of the tooth. The width of the lateral incisor was reduced in increments of 1 mm while maintaining the level of marginal gingiva. The wide area of the crown between the inter-proximal point of contact was measured.

The spacing between the two upper incisors is known as the midline diastema. The widening of space up to 0.5 mm was done then the inter-proximal point of contact between the crown of central incisors was measured.

Height of papilla was refashioned symmetrically between the teeth of upper anterior by lengthening the inter-proximal point of contact up to 0.5 mm gingivally between all the teeth of upper anterior. So that the natural shape of papilla and tooth was maintained.

20 refashioned smile photographs (five variants each of the four aesthetic parameters) were randomly grouped so that intra and inter parameter variations were minimized. Copies of the questionnaire were distributed among all the three groups.

A visual analogue scale (VAS) graded from 1 to 10 was used for the ratings and is presented below the questionnaire. The scale progresses on one end to the other from "very pleasing" to "unpleasing." Each person was asked to mark a location along with the scale based on their prediction of dental aesthetics.

The VAS scores rated by all the groups were analyzed to find out the mean and standard deviation of all twenty altered smile Photographs. These were used for the statistical comparison using the one-way analysis of variance (ANOVA) test for comparison between all groups; post hoc test for multiple comparisons between all the groups was also employed.

III. RESULTS

The statistical tests used were ANOVA and post hoc tests. Initially, the mean was found of each group and an ANOVA test performed to compare all parameters between the groups, and later the Mann-Whitney test (post hoc) was used to predict the correlation of parameters within each group.

An ANOVA test was conducted in all groups to predict the level of deviation related to groups. Significant overall tests were followed with post hoc multiple comparisons to test hypotheses. Multiple comparisons were done at each variation to evaluate the deviation level discriminated at each group between aesthetic and minimal dental aesthetic features.

The assessment for all the four parameters has shown a significant difference in perception by all three groups. The multiple comparison tests showed the difference in perception within the groups (TABLE 1) describes the standard deviation and mean of all the four parameters (TABLE 2) shows ANOVA test of all four parameters between groups, and (TABLE 3) denotes post hoc test of all four parameters between and within the groups.

The distinct variables under each dependent factor (Crown Length, etc.,) are summarized to get the combined score as shown below.

Crown Width Score	=	VAR1+VAR5+VAR9+VAR13+VAR17
Crown Length Score	=	VAR2+VAR6+VAR10+VAR14+VAR18
Papillary Height Score	=	VAR3+VAR7+VAR12+VAR16+VAR20
Midline Diastema	=	VAR4+VAR8+VAR11+VAR15+VAR19

The combined score variables are taken to further analysis. The statistical tests used were ANOVA and post hoc tests. Initially, the mean was found for each group and an ANOVA test is performed to compare all the parameters between the groups and later post – hoc test was used to compare the parameters within the groups. (Groups: 1– Layperson, 2 – Dentist, 3 – Orthodontist)

The below table explores the descriptive statistics of dependent variables concerning each group.

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		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
CROWNWIDTH	1	50	24.40	4.68	0.66	23.07	25.73	11	30
	2	50	27.54	6.29	0.89	25.75	29.33	15	44
	3	36	31.81	6.20	1.03	29.71	33.90	20	47
	Total	136	27.51	6.39	0.55	26.43	28.60	11	47
CROWNLENGTH	1	50	16.44	5.13	0.73	14.98	17.90	9	26
	2	50	24.20	7.24	1.02	22.14	26.26	7	34
	3	36	25.36	4.70	0.78	23.77	26.95	14	35
	Total	136	21.65	7.10	0.61	20.45	22.86	7	35
PAPILLARY HEIGHT	1	50	37.52	7.59	1.07	35.36	39.68	16	47
	2	50	31.14	7.56	1.07	28.99	33.29	14	43
	3	36	32.28	5.43	0.91	30.44	34.12	20	40
	Total	136	33.79	7.60	0.65	32.50	35.08	14	47
MIDLINE	1	50	36.48	5.51	0.78	34.91	38.05	24	47
	2	50	28.88	5.62	0.80	27.28	30.48	17	44
	3	36	34.22	3.32	0.55	33.10	35.35	27	41
	Total	136	33.09	6.04	0.52	32.06	34.11	17	47

Table 1:- Descriptiv

Hypothesis: There is no significance between the groups in scoring the parameters.
Alternative Hypothesis: There is significance between the groups in scoring the parameters.
Level of Significance: 0.05

		Sum of Squares	Df	Mean Square	F	Sig.
CROWNWIDTH	Between Groups	1147.912	2	573.956	17.524	0.00
	Within Groups	4356.059	133	32.752		
	Total	5503.971	135			
CROWNLENGTH	Between Groups	2178.132	2	1089.066	31.28	0.00
	Within Groups	4630.626	133	34.817		
	Total	6808.757	135			
PAPILLARY HEIGHT	Between Groups	1129.094	2	564.547	11.268	0.00
	Within Groups	6663.722	133	50.103		
	Total	7792.816	135			
MIDLINE	Between Groups	1506.959	2	753.479	2.285	0.370
	Within Groups	3421.982	133	25.729		
	Total	4928.941	135			

Table 2:- Anova Test

Hypothesis: There is no mean difference between the groups in scoring the parameters.
Alternative Hypothesis : There is a mean difference between the groups in scoring the parameters.
Level of Significance: 0.05

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LSD						95% Confidence Interval	
Dependent Variable	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
CROWNWIDTH	1	2	-3.140*	1.145	0.007	-5.4	-0.88
		3	-7.406*	1.251	0	-9.88	-4.93
	2	1	3.140*	1.145	0.007	0.88	5.4
		3	-4.266*	1.251	0.001	-6.74	-1.79
CROWNLENGTH	1	2	-7.760*	1.18	0	-10.09	-5.43
		3	-8.921*	1.29	0	-11.47	-6.37
	2	1	7.760*	1.18	0	5.43	10.09
		3	-1.161	1.29	0.37	-3.71	1.39
PAPILLARY HEIGHT	1	2	6.380*	1.416	0	3.58	9.18
		3	5.242*	1.547	0.001	2.18	8.3
	2	1	-6.380*	1.416	0	-9.18	-3.58
		3	-1.138	1.547	0.463	-4.2	1.92
MIDLINE	1	2	1.100	1.014	0.370	-3.59	5.61
		3	1.258	1.109	0.443	-2.06	4.45
	2	1	-0.600	1.014	0.273	-1.61	1.59
		3	-1.342	1.109	0.554	-4.54	-0.15

*. The significant difference of mean is 0.05

Table 3:- Multiple Comparisons

➢ *Crown Width:*

The laypersons were more critical in identifying the discrepancy in this esthetic parameter than the other groups (Mean of 24.40 and S.D. of 4.68) [Table 1]. The ANOVA table explains that there is no significant difference in mean between groups. (Sig. value is 0.00 <0.05 i.e. Null hypothesis was accepted at the significance level of 5%) [Table 2] The multiple comparison tests also evidenced that there is no significant value between all the three groups [Table 3].

➢ *Crown Length:*

The orthodontists showed a higher threshold level for the unattractive crown length than the other groups (Mean of 25.36 and S.D of 4.70) [Table 1]. The ANOVA table explains that there is no significant difference in mean between groups.

(Sig. value is 0.00 <0.05 i.e. Null hypothesis was accepted at the significance level of 5%) [Table 2] . The post – hoc test showed a rejection of the Null hypothesis between the Dentists and the orthodontists. (Mean difference is -1.167 with sig. value 0.37(>0.05)) i.e. the scores between Dentists and orthodontists were similar for crown length parameter.

➢ *Papillary Height:*

In this parameter, Dentists were found to be more critical in providing the scores than the other groups. (Mean of 31.14 and S.D of 7.56). [Table 1]The null hypothesis was accepted at the significance level of 5% since the Sig. Value is 0.00 (<0.05). There was no statistically significant difference among groups in scoring this parameter. However, the multiple comparison tests show that the Dentists and Orthodontists were scored similarly for the papillary Height parameter. (Mean Difference of -1.138 and Sig. value of 0.463) [Table3].

➢ *Midline Diastema:*

The Dentist showed less threshold level to be unattractive (mean of 28.88 and S.D of 5.62) [Table 1]. From the ANOVA table, this parameter rejects the null hypothesis at 5% level of significance, whereas all other parameters were accepted hypothesis with significance value lesser than the level of significance i.e. there is significance between the groups in scoring this parameter. The post – hoc test also strongly proves that there is much significance between the Laypersons, Dentists and Orthodontists in scoring the Midline Diastema.

IV. DISCUSSION

This study examined the attractiveness with regards to the length of the crown, the width of the crown, midline diastema, height of papilla. The visual analogue scale was provided for the judges to rate the attractiveness in a simple and rapid method. Discrepancies in the crown length have been discussed in the literature for some time and several investigators have described them unattractive. The discrepancy between the midline of dentition and face was 2mm among laypersons and was less aesthetic according to the study conducted by Johnston C et al., [1999][4]. The present study shows that Orthodontists identified the unattractive crown length discrepancies than the other groups. This supported the results of previous studies conducted by O.Kokick et al.,2006 [5] Vinod Krishnan et al.,2008 Gul-e-Erum et al.,2008 studies concluded that crowns with shorter length were found less aesthetically appreciated. [6], [7] Another aesthetic parameter reviewed in this study was the width of the lateral incisors. The study showed that all three groups could equally identify bilateral discrepancies in this parameter. This result was matching with the previous study results obtained by O. Kokick et al., 2006 [5] and others. This report notified the tooth

proportion importance while managing patients with a discrepancy in the width of the teeth particularly, with peg laterals. The midline of the dentition is the crucial point in smile aesthetics. Any discrepancies at the midline affect the smile curve significantly. The present study revealed that dentists and laypersons were less keen on identifying the midline diastema than orthodontists. But more distance between the central incisors was found unpleasing by all the three groups equally. This result was contrary to the results obtained by the previous research of Thomas et al., 2009 Zachrisson BU et al., 1998 and others which explained that all the three groups could equally detect any midline discrepancies. [6], [1] In this study dentists were found more critical in providing the scores than other groups. But the results showed that the dentists and orthodontists were scored similarly for the papillary height parameter. According to Pinho S [2007], the perceptions of aesthetic look vary among dentists and laypersons [8]. According to the research conducted by Lavaca MI [2005], the asymmetrical deficiency of the inter-dental papilla more than 2mm gives an unaesthetic look [9]. According to S. E. Bishara [1994], dental and facial asymmetries should be identified and treated as per the patient's needs [10]. Geron in his study on the influence of gender on the perception of oral and smile aesthetics with varying gingival margin, concluded that 1 mm of upper gingival exposure at smile and speech was within the aesthetic range.[11] According to Peck S [1992], gender differences were found in lip length and profile. [12] Previous research done by Kurth and Kokich concluded that papillary height discrepancies of 2.0 mm were not aesthetically accepted by laypersons.[5] The study conducted by Ackerman et al[1999] shows that the soft tissue plays a crucial role in aesthetics so soft tissue position should be maintained in orthodontic management[13].

V. CONCLUSION

The conclusions from this study are: Asymmetric refashioning of teeth creates an unpleasant appearance to both dentists and laypersons. The symmetric refashioning of teeth could create an unpleasant appearance to dentists, but this might not be recognized by the laypersons. Orthodontists were capable to identify the crown width, midline diastema and papillary height at a small deviation from the general dental professionals and laypersons. Hence, these parameters should be taken into consideration during the orthodontic treatment plan. Among all the four aesthetic parameters, midline diastema was more unattractive for all the groups. So, the correction of this parameter by the dental professionals is of paramount importance for a better aesthetic result. Since this study gives an insight into the perception of aesthetics by orthodontists, general dentists and the laypersons, a detailed examination of smile criteria should be stressed before planning orthodontic treatment, to give the best possible smile for the patient.

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