



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY HEALTH SCIENCES

ISSN: 2394 9406

Perception of Dentists and Orthodontists to Altered Dental Esthetics

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ABSTRACT

Introduction: Most people seek orthodontic treatment for esthetic as prime reason. Any asymmetry or variation on face on smiling gets noticed and is predictor of reduced facial attractiveness and increased levels of self-perception. Few amongst them are occlusal cant, midline shift, and anterior gingival exposure.

Aim: To determine esthetic perception of dentists and orthodontists to altered dental esthetics

Material and Methods: An ideal frontal smile was selected which was later modified for the purpose of study. Four gradual alterations were produced from original photograph in amount of occlusal cant, lower midline shift, and upper anterior gingival display. These photographs were then presented to evaluators for assessment of attractiveness. Evaluation of images was performed by 4 groups-20 female orthodontist, 20 male orthodontist, 20 female dentists, and 20 male dentists. Evaluators were told to judge attractiveness of smiles by Visual Analog Scale.

Results: The data collected was analyzed using unpaired t –test .The results showed that dentist were able to identify cant of 3mm or more while orthodontist could identify at 1 mm itself. For midline shift, both male and female orthodontist and dentist gave similar score. Orthodontists were able to identify 2 mm of gingival exposure and scored it to be less acceptable in comparison to dentists who identified 3mm or more.

Conclusion: There is difference in dentists and orthodontists perception of smile. Orthodontists were significantly more perceptive to the changes in the occlusal plane and anterior gingival exposure than dentists.

KEYWORDS: smile, perception, occlusal cant, midline shift, gingival display, visual analog scale.

Introduction:

Smiling is unique gesture to humans and is important in evaluation of facial attractiveness. Most people seek orthodontic treatment for esthetic as prime reason. Identification of esthetic problem is not always an easy task, because no two people think alike. Any asymmetry or variation on face on smiling gets noticed and is predictor of reduced facial attractiveness and increased levels of self perception¹. Such asymmetries can occur along the different planes of space .Few amongst them are roll, pitch and yaw.

Roll describes the vertical position of the teeth when this is different on right and left sides². Yaw is the midline discrepancy due to rotation of jaw or teeth on one side or the other². Pitch describes the increased or decreased gingival exposure either in anterior or posterior region. (Pitch down or up)². Figure I shows the above three variation along the planes in which they occur⁴.

Studies report that orthodontists are less tolerant than laypersons when evaluating certain dento-facial characteristics³. Studies have also shown that general dentists are more perceptive to above characteristics than laypeople⁴. Studies have also been done among different dental specialties but not much difference in their perception was found⁵. However, there are not many studies to ascertain the perception differences between general dentist and orthodontist. This study intends to evaluate such perception difference if they exist.

Aims and Objectives:

1. To determine esthetic perception of dentists and orthodontists to –

- a. various degree of occlusal cant (roll).
- b. various amount of midline shift(yaw)
- c. various amount of anterior gingival display(pitch).

Material and Methods:

An ideal frontal smile was selected which was later modified for the purpose of study. Adobe photoshop 7 was used for modification of images.

Four gradual alteration were produced from original photograph in amount of canting of occlusal plane(roll). Four gradual alteration were produced from original photographs in amount of lower midline shift(yaw). Four gradual alteration were produced from original photographs in amount of anterior gingival display (pitch down anteriorly). Figure I, II, III and IV are the images showing the alteration that were produced in the occlusal cant, midline shift and anterior gingival display.

These 14 photographs were randomly organized and numbered from 1 to 14 into multimedia presentations using PowerPoint 2007(Microsoft Office 2007). The photographs were then presented to evaluators for assessment of attractiveness. Presentation time was 10 seconds for each photograph. Evaluators could not go back to see previous images. Visual analog scale (VAS) with 10 mm markings was used for assessment of attractiveness. Attractiveness here meant what is supposed to be ideal smile and unattractiveness meant any deviation from ideal. On visual analog scale (VAS), leftmost position indicated (0) “very unattractive” and rightmost position indicated (10) “very attractive” smile.

Figure 5 shows visual analog scale which was used.

Evaluation of images was performed by 4 groups-

A1 - 20 Female Orthodontists

A2 - 20 Male Orthodontists

B1 - 20 Female Dentists

B2 - 20 Male Dentists

All evaluators were told to judge attractiveness of smiles by Visual Analog Scale.

Data and Statistical Analysis:

The data collected was recorded. It was then statistically analyzed using unpaired student t test.

Results:

Occlusal cant (roll):

The results showed that for 0 mm cant image, dentist and orthodontist have similar scores both males and females. Orthodontist gave less score to cant of 1 mm in comparison to dentist but the difference was not significant statistically. The same was seen with 2mm of cant. For 3mm and 4mm of cant there was significant difference in dentist ($p=0.0029$) and orthodontist ($p=0.00277$) scores. This showed that dentists were able to identify cant of 3mm or more with significant difference while orthodontist could identify at 1 mm itself.

Midline shift (Yaw):

For midline shift, both orthodontist and dentist gave similar score. They equally recognized the deviation. They could identify 1mm of deviation from ideal. Their score reduced with increase in midline shift.

Anterior gingival display (Pitch):

In the results of anterior gingival display, dentist and orthodontist showed significant difference in their scores. ($p=0.0029$). Orthodontist can identify 2 mm exposure and scored it to be less acceptable in comparison to dentist who gave similar score for 1 mm and 2 mm. However, for further gingival exposure (3 mm) dentist score decreased considerably in both groups.

Discussion:

Facial attractiveness is defined more by smile than by soft tissue relationships at rest². For this reason, it is important to analyse the characteristics of the smile and to think about how the dentition relates to the facial soft tissues dynamically as well as statically². The various features of smile are viewed differently by different people². Studies have been done to evaluate perception of laypeople and orthodontist to mini-esthetics (tooth -lip relationship, amount of tooth and gingival display, buccal corridor and smile arc) and micro-esthetics (golden proportion, height-width relationships, gingival heights, shape and contour black triangles) and facial profile^{2,5-11}. The present study have included parameters which are different from above mention ones but are as important in smile analysis of a person. These are, occlusal cant (roll), midline shift(yaw), anterior gingival display(pitch). Studies are conducted taking these parameters and perception of laypeople and orthodontist or dentist have been evaluated and how much difference it makes to the smile of individual is also seen. As mentioned earlier not many studies have been done to evaluate perception difference between a general

dentist and orthodontists. Such studies are important as it brings to light how different parameters of smile are perceived by different professional working with the same objective in society that is ideal smiles. The present study included equal number of male and female evaluators to see if gender difference exists in perception to smile amongst dentists and orthodontists.

The study was strictly conducted in manner mention on material and methods to keep the bias to the minimum and finally the results to evaluate the difference was derived .The results of the study have shown that female gave less scores as compared to males for midline shift and anterior gingival display but their score showed no consistent difference for occlusal cant. The possibility of gender influences on the perceptions can be introduced but it is not clear enough to conclude that whether such difference do exist¹². However the study showed difference in dentists and orthodontists' perception to varying amount of occlusal cant and anterior gingival display.

All evaluators gave higher scores to images displaying 0 mm of cant, gingival exposure and midline shift showing that it is more aesthetic and pleasing. In this study, dentists gave higher scores in comparison to orthodontists. Occlusal cant was not as easily recognizable in the study by dentists in comparison to orthodontists .Midline shift images were rated similarly by both dentists and orthodontists showing no perception differences. Orthodontist could identify 2 mm exposure and scored it to be less acceptable in comparison to dentist who gave similar score for 1 mm and 2 mm. but, for further gingival

exposure (3 mm) dentist score reduced considerably in both groups.

Thus, according to the study there is difference in perception of dentist and orthodontist to above variations in dental esthetics with orthodontist being more perceptive to altered occlusal cant and anterior gingival display. According to literature, When it comes to identifying changes in the gingival plane a significant identification by dentists was observed, although with no statistically significant difference among the different specialty groups¹³. The result of present study is consistent with the results of Peck and Peck¹⁴, who stated that a variation up to 1 mm of gingival exposure is considered aesthetically pleasing. Also, Kokich et. al.¹⁵ found that laypeople and general dentists consider gingival exposure up to 4 mm to be acceptable, while orthodontists consider gingival exposure of more than 2 mm to be unaesthetic, contrary to the results presented in this paper. The present study states that for general dentist 3mm of display is considered acceptable, however for orthodontist group results coincide.

The present study was done taking on the smile and mouth region. The results may vary when we see a person's whole face rather than just the smile and mouth region. Also, further studies with more sample size would be beneficial and recommended.

Conclusion:

1. There is difference in dentists and orthodontists perception of smile analysis.
2. Orthodontists were significantly more perceptive to the changes in the occlusal plane and anterior gingival exposure than dentists.

3. Orthodontist's threshold for occlusal cant is 1mm while dentist's is 3mm.
4. Threshold for midline shift is same for both, that is 1mm.
5. Orthodontist's threshold for gingival display is 2mm while dentist's is 3mm.

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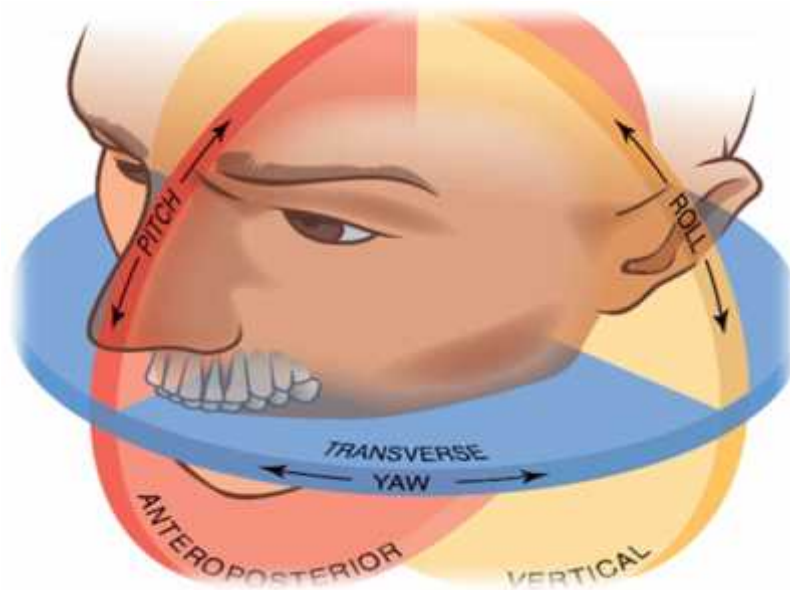


Figure 1. Showing pitch, roll and yaw along the planes in which they occur.



Figure 2: Occlusal cant images

Figure 3: Midline shift

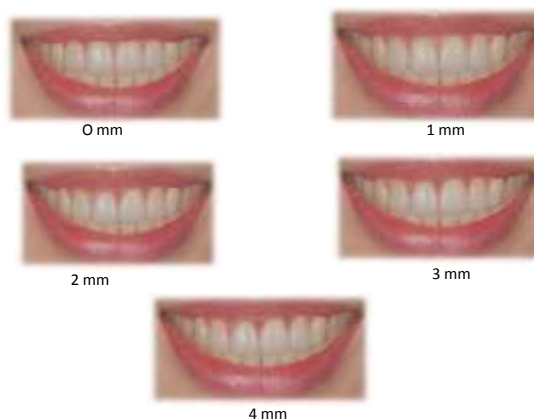


Figure 4: Gingival display images

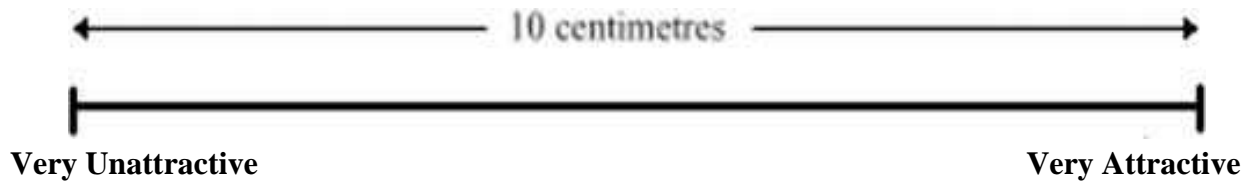


Figure 5: Visual analog scale (VAS)

Sr. No.	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1
	0mm				1 mm				2 mm				3mm				4mm			
1	6	5	8	7	6	7	6	6	7	6	5	3	4	5	4	5	3	4	3	4
2	6	7	9	5	7	7	6	5	6	6	7	5	3	4	4	3	2	3	3	2
3	6	7	5	5	6	7	6	6	7	6	7	3	4	5	2	3	3	4	1	2
4	7	5	6	8	7	7	5	6	6	8	8	5	5	4	2	3	4	3	1	2
5	8	6	9	7	6	8	5	6	7	7	4	5	3	5	5	5	2	4	4	4
6	7	7	5	5	6	7	6	6	7	6	8	5	3	4	3	4	2	3	2	3
7	8	5	6	7	6	6	5	8	7	5	8	5	4	5	3	5	3	4	2	4
8	9	6	5	5	6	6	5	7	7	5	7	7	4	4	3	3	3	3	2	2
9	6	5	6	8	7	6	5	7	6	5	7	7	4	5	3	3	3	4	2	2
10	6	8	6	5	7	6	5	8	6	5	6	7	4	5	2	2	3	4	1	1
11	8	6	7	8	5	8	6	6	7	7	7	8	3	4	3	3	2	3	2	2
12	9	9	8	8	5	9	6	6	7	8	7	8	5	4	2	2	4	3	1	1
13	5	6	7	9	5	8	6	7	5	7	8	7	3	4	3	3	2	3	2	2
14	6	6	8	8	5	6	6	6	7	5	3	8	5	4	5	5	4	3	4	4
15	7	5	8	8	5	6	6	7	7	5	4	8	3	4	3	3	2	3	2	2
16	7	6	8	8	6	8	6	7	5	7	3	8	3	5	2	2	2	4	1	1
17	8	6	7	6	8	6	6	7	7	5	4	4	3	3	3	3	2	2	2	2
18	6	6	8	6	6	6	7	6	5	5	3	2	3	3	2	5	2	2	1	4
19	7	7	8	7	6	8	6	6	5	7	4	2	5	3	3	3	4	2	2	2
20	6	8	7	7	6	6	6	6	5	5	3	2	4	4	2	2	3	3	1	1
Avg.	6.9	6.3	7.05	6.85	6.05	6.9	5.75	6.45	6.3	6	6.65	5.45	3.75	4.2	2.95	3.35	2.75	3.2	1.95	2.35

Average scores and	6.9	6.3	7.05	6.85	6.05	6.9	5.75	6.45	6.3	6	5.65	5.45	3.75	4.2	2.95	3.35	2.75	3.2	1.95	2.35
P values	0.347461	0.081416			0.092127	0.055048			0.090858	0.161818			0.002998	0.002775			0.002998	0.002775		

Table I: Scores given by the 4 groups to images showing 0mm, 1mm, 2mm, 3mm and 4mm of occlusal cant and the p- values.

Sr. No.	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1
	0mm				1 mm				2 mm				3mm				4mm			
1	6	5	8	7	4	3	6	5	3	2	5	4	3	3	5	4	2	3	4	3
2	6	7	9	5	4	5	7	3	3	4	6	2	5	3	6	2	4	2	5	1
3	6	7	5	5	4	5	3	3	3	4	2	2	5	3	2	4	4	2	1	3
4	7	5	6	8	5	3	4	6	4	2	3	5	3	4	3	4	2	2	2	4
5	8	6	9	7	6	4	7	5	5	3	6	4	4	3	6	3	3	2	5	3
6	7	7	5	5	5	5	3	3	4	4	2	2	5	3	2	3	4	2	1	3
7	8	5	6	7	6	3	4	5	5	2	3	4	3	5	3	3	2	4	2	3
8	9	6	5	5	7	4	3	3	6	3	2	2	4	3	2	3	3	2	1	3
9	6	5	6	8	4	3	4	6	3	2	3	5	3	3	3	3	2	4	2	4
10	6	8	6	5	4	6	4	3	3	5	3	2	6	3	3	4	5	2	2	3
11	8	6	7	8	6	4	5	6	5	3	4	5	4	4	4	4	3	3	3	4
12	9	9	8	8	7	7	6	6	6	6	5	5	7	4	5	3	6	4	4	4
13	5	6	7	9	3	4	5	7	2	3	4	6	4	4	4	4	3	3	3	5
14	6	6	8	8	4	4	6	6	3	3	5	5	4	3	5	3	3	3	4	4
15	7	5	8	8	5	3	6	6	4	2	5	5	3	4	5	4	2	3	4	4
16	7	6	8	8	5	4	6	6	4	3	5	5	4	4	5	3	3	3	4	4
17	8	6	7	6	6	4	5	4	5	3	4	3	4	2	4	3	3	3	3	2
18	6	6	8	6	4	4	6	4	3	3	5	3	4	4	5	3	3	3	4	2
19	7	7	8	7	5	5	6	5	4	4	5	4	5	4	5	3	4	3	4	3
20	6	8	7	7	4	6	5	5	3	5	4	4	6	2	4	3	5	3	3	3
Avg.	6.9	6.3	7.05	6.85	4.9	4.3	5.05	4.85	3.9	3.3	4.05	3.85	4.3	3	4.05	3.5	3.3	2.8	3.05	3.25

Average scores and P values

7.05 6.85 4.9 4.3 5.05 4.85 3.9 3.3 4.05 3.85 4.3 4.85 4.05 4.25 3.3 3.85 3.05 3.25

0.347461 0.081416

0.347461 0.081416

0.347461 0.081416

0.257814 0.050293

0.257814 0.050293

Table II: Scores given by the 4 groups to images showing 0mm, 1mm, 2mm, 3mm and 4mm of midline shift and p- values

Sr. No.	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1	B2	B1	A2	A1
	0mm				1 mm				2 mm				3mm				4mm			
1	6	5	8	7	5	4	5	4	4	3	4	3	3	2	3	2	2	1	2	1
2	6	7	9	5	5	6	6	2	4	5	5	1	3	4	4	0	2	3	3	1
3	6	7	5	5	5	6	2	2	4	5	1	1	3	4	0	0	2	3	1	1
4	7	5	6	8	6	4	3	5	5	3	2	4	4	2	1	3	3	1	0	2
5	8	6	9	7	7	5	6	4	6	4	5	3	5	3	4	2	4	2	3	1
6	7	7	5	5	6	6	2	2	5	5	1	1	4	4	0	0	3	3	1	1
7	8	5	6	7	7	4	3	4	6	3	2	3	5	2	1	2	4	1	0	1
8	9	6	5	5	8	5	2	2	7	4	1	1	6	3	0	0	5	2	1	1
9	6	5	6	8	5	4	3	5	4	3	2	4	3	2	1	3	2	1	0	2
10	6	8	6	5	5	7	3	2	4	6	2	1	3	5	1	0	2	4	0	1
11	8	6	7	8	7	5	4	5	6	4	3	4	5	3	2	3	4	2	1	2
12	9	9	8	8	8	8	5	5	7	7	4	4	6	6	3	3	5	5	2	2
13	5	6	7	9	4	5	4	6	3	4	3	5	2	3	2	4	1	2	1	3
14	6	6	8	8	5	5	5	5	4	4	4	4	3	3	3	3	2	2	2	2
15	7	5	8	8	6	4	5	5	5	3	4	4	4	2	3	3	3	1	2	2
16	7	6	8	8	6	5	5	5	5	4	4	4	4	3	3	3	3	2	2	2
17	8	6	7	6	7	5	4	3	6	4	3	2	5	3	2	1	4	2	1	0
18	6	6	8	6	5	5	5	3	4	4	4	2	3	3	3	1	2	2	2	0
19	7	7	8	7	6	6	5	4	5	5	4	3	4	4	3	2	3	3	2	1
20	6	8	7	7	5	7	4	4	4	6	3	3	3	5	2	2	2	4	1	1
Avg	6.9	6.3	7.05	6.85	5.9	5.3	4.05	3.85	4.9	4.3	3.05	2.85	3.9	3.3	2.05	1.85	2.9	2.3	1.05	0.85

Average scores and P values 6.9 6.3 7.05 6.85 6.05 6.9 5.75 6.45 6.3 6 5.65 5.45 3.75 4.2 2.95 3.35 2.75 3.2 1.95 2.35
 0.347461 0.081416 0.092127 0.055048 0.090858 0.161818 0.002998 0.002775 0.002998 0.002775

Table III: scores given by the 4 groups to images showing 0mm, 1mm, 2mm, 3mm and 4mm of upper anterior gingival display and the p- values

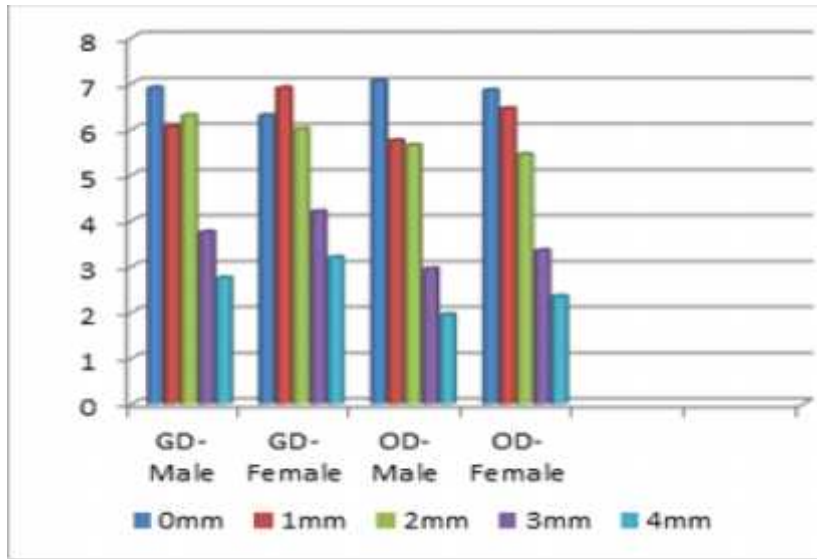


Chart I: Bar diagram plotted for rating of 4 groups for images with varying degree of occlusal cant.

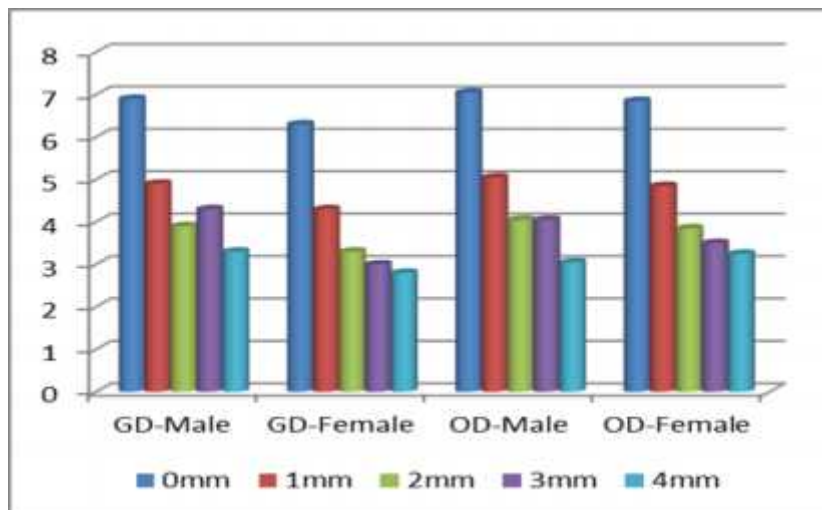


Chart II: Bar diagram plotted for rating of 4 groups for images with varying amount of midline shift.

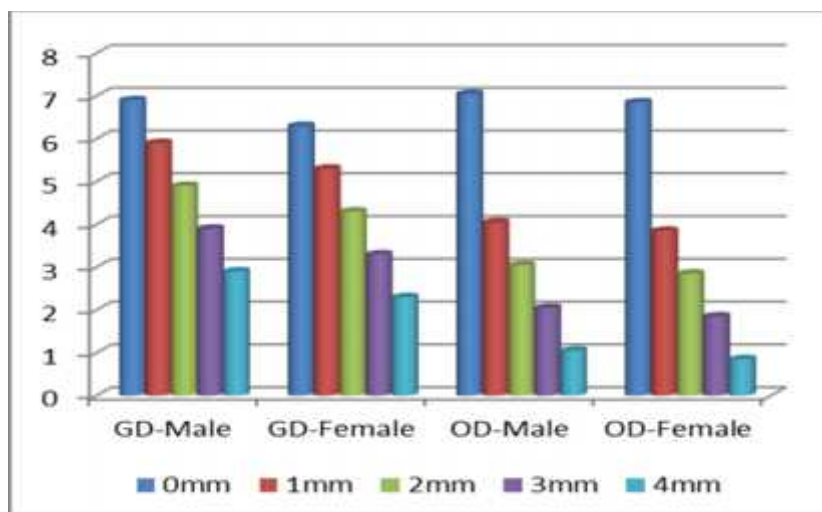


Chart III: Bar diagram plotted for rating of 4 groups for images with varying amount of anterior gingival display.