

# ASSESSMENT OF ATTRACTIVENESS OF SMILE BASED ON CANINE SHAPE AND POSITION- A PHOTOGRAPHIC ANALYSIS

Asha.S.Hariharan<sup>1</sup> Subhabrata Maiti<sup>2</sup> Rakshakan V<sup>3</sup>

<sup>1</sup>*Department Of Prosthodontics Saveetha Dental College and Hospitals, Saveetha Institute Of Medical and Technical Sciences Saveetha University Chennai*

<sup>2</sup>*Senior Lecturer Dept Of Prosthodontics Saveetha Dental College and Hospitals , Saveetha Institute Of Medical and Technical Science Saveetha University Chennai*

<sup>3</sup>*Senior Lecturer Dept Of Prosthodontics Saveetha Dental College and Hospitals, Saveetha Institute Of Medical and Technical Science Saveetha University Chennai*

<sup>1</sup>[hariharan.asha00@gmail.com](mailto:hariharan.asha00@gmail.com)

<sup>2</sup>[subhabratamaiti.sdc@saveetha.com](mailto:subhabratamaiti.sdc@saveetha.com)

<sup>3</sup>[rakshagan.sdc@saveetha.com](mailto:rakshagan.sdc@saveetha.com)

## ABSTRACT :

Canine is the cornerstone of the arch, and has a strategic position . The current study involves assessment of attractiveness of smile based on canine shape and position. The study was done in a university hospital setting of Saveetha Dental College. The study was designed to be a cross sectional retrospective study. The study was based on the photographic analysis of the position, shape and prominence of canine and its effect on the perceived esthetics of the smile. 70 photographs of patients were selected from the institution's database, and evaluated. The perceived esthetics of each smile was graded on scale of 1-5, 5 being excellent aesthetics. The obtained data was tabulated and statistical analysis was done using SPSS( Version 23) .There was a statistically significant association with the position( $p=0.012$ ) and shape( $p=0.006$ ) and cervical prominence of the canine( $p=0.000$ ) with the perceived esthetics. The position and characteristics of the canine play a major role in the perception of aesthetics of the smile. A better understanding of these factors could highly improve the process of teeth selection or the rehabilitation of smiles

**Keywords:** Aesthetics ,Canine Position, Canine shape, Smile line

## INTRODUCTION:

An appealing smile puts forth the image of a positive character for a person and plays an important part in daily interactions(Faure, 2002).It instantly captures the eye and could considerably affect the patient quality of life and well being(Calvo *et al.*, 2013). The aesthetics of smile is defined by a multitude of parameters such as the tooth proportion, their angulation, symmetry dental shape, the buccal corridor space, the gingival zeniths and more(Chiche and Pinault, 1994)(Kokich, Asuman Kiyak and Shapiro, 1999)(Wolfart *et al.*, 2005). It also depends on the peri oral structures necessitating a need for the harmonious relation between intra and extra oral determinants of an aesthetic smile(Arigo *et al.*, 2018).

Among the intra oral elements of smile the position and angulation of the incisors and canines play a paramount role(Basha, Ganapathy and Venugopalan, 2018; Kannan and Venugopalan, 2018). Several studies have been done concerning the incisors in smile(Brunzel *et al.*, 2006)(Machado, Moon and Gandini, 2013)(Ganapathy *et al.*, 2016)(Jain, Ranganathan and Ganapathy, 2017)(Jain, Kumar and Manjula, 2014). Maxillary canines play a significant and dynamic role in the perception of esthetics as well as in occlusal gnathology. They have a strategic position in the arch between the anteriors and posteriors acting as the “cornerstone” of the dental arch(Felicita and Sumathi Felicita, 2017). Canines

along with the incisors have the major potential to define the character of an individual's smile(Bothung *et al.*, 2015). The position of the canine and incisors with regards to the occlusal plane define the smile line which is an important aspect of esthetics in smile(Sarver, 2001).

Most studies relating to the esthetics of the smile are related to the position of incisors and the buccolingual position of canines and done mostly as photographic evaluation pertaining to the western population(Paiva *et al.*, 2018) (Xu *et al.*, 2015). There is a sheer lack of literature on the vertical position of canine with respect to the occlusal plane, its cervical and cusp tip prominence and its effect on esthetics among males and females. The current study could prove to be a valuable piece of literature guiding in the process of teeth selection during the fabrication of complete denture or during cases requiring rehabilitation of an entire smile or esthetic corrections. The use of photographs of intraoral centric as well as full face frontal profile smiles enables a comprehensive evaluation and helps to draw conclusions regarding the role of canine in smile.

Thus the aim of the study is to evaluate the vertical position of canine, the cervical prominence and the cusp tip and to assess its role in the perception of aesthetics in smile.

### **MATERIAL AND METHODS :**

The current study was done during the period of March- April 2020 in the university hospital setting of Saveetha Dental College, Chennai. The study was based on the photographic evaluation of smiles. Photographs of 70 subjects were obtained from the institutional records which is a meticulously maintained system consisting of over 86,000 patient records(Figure 4 and 5).

Inclusion Criteria: Patients between the age of 18-25 years

Intact maxillary anteriors and canines

Absence of caries

Exclusion criteria: Presence of esthetic restoration or crowns

The smile was evaluated on the basis of three criterias:

- Vertical position of the canine with respect to the occlusal plane
- Cervical prominence of the canine
- The prominence of the cusp tip

An overall esthetic score was also given on a scale of 1-5, 5 being excellent esthetics and 1 being poor esthetics.

The study was approved by the institutional review board, Consent was obtained from the patients after explaining what their photographs would be used for. Confidentiality of the patients were maintained.

Data obtained was tabulated on excel sheets and the statistical analysis was performed using SPSS software, Version 23. Descriptive statistics was done to analyse the frequency and percentages and Chi square test was done to describe the influence of canine in the perception of esthetics.

### **RESULTS :**

Canine position at the level of occlusion (34.5%) and above the level of occlusion(47.1%) was associated with good to very good esthetics(Figure 1).A sharp cusp tip (59.1%) (Figure 2)and prominent cervical bulge(24.4%) (Figure 3)were also seen associated with excellent esthetics. There was a statistically significant correlation between the position of the canine( $p=0.012$ ), prominence of cusp tip( $p=0.006$ ), and cervical prominence ( $p=0.000$ ) with the perception of aesthetics(Table 1).

### **DISCUSSION :**

With the increasing demand for elective esthetic restoration(Ajay *et al.*, 2017) (Ajay *et al.*, 2017)(Monalisa and Jayalakshmi, 2016)dentists are obligated to understand the factors that come together to create a balanced and harmonious smile(Peck and Peck, 1995). The societal biases based on appearance and beauty can have a great impact on a person's quality of life(Clifford and Walster, 1973; Kenealy, Frude and Shaw, 1988), making dentofacial attractiveness a major part of psychosocial well being(Jyothi *et al.*,

2017)(Subasree, Murthykumar and Dhanraj, 2016)(Vijayalakshmi and Ganapathy, 2016)(Selvan and Ganapathy, 2016).

Despite the importance of dental aesthetics, the basis of esthetic rehabilitation is on guidelines and authoritative literature existing on denture teeth selection(Anderson *et al.*, 2005)(Ashok and Suvitha, 2016)(Ashok *et al.*, 2014)(Venugopalan *et al.*, 2014). The principle of teeth selection based on the shape of the face laid down by William et al was refuted by Bell et al and Seluk et al.(Bell, 1978; Seluk, Brodbelt and Walker, 1987) Even the concept that men should be given ‘sharp and square’ teeth and women should be given softer features did not stand the test of time. Most of the esthetic studies paid little attention to the position and morphology of the canines as they make up a relatively smaller portion of tooth display as compared to the incisors, and dentists usually concentrate on the functional aspect of canines in terms of occlusion rather than its appearance(Johnson, 1992)(Duraishamy *et al.*, 2019).

The results of the current study correlated the position of the canine to be at or above the plane of occlusion, in cases with higher esthetic value. This was in agreement to Ackermann(Mahshid *et al.*, 2004; Rai, Janardhanam and Rai, 2015) who proposed to create a staircase by placing the canine at a higher level as compared to the incisors. A convex smile was considered to be more esthetically pleasing than a concave one(Ackerman *et al.*, 1998; Sarver, 2001). This study was also concluded that the cervical prominence and prominent cusp tips were also perceived to be aesthetic. This conclusion was made irrespective of the gender, contradictory to the popular beliefs of giving softer and more rounded features for women(Frush and Fisher, 1955)(Ganapathy, Kannan and Venugopalan, 2017). Study by Bothung C and Fischer stated that the ideal position for canine in a vertical aspect is parallel to the imaginary line formed by the lateral canthus and the ipsilateral labial angle(Bothung *et al.*, 2015)(Rufenacht, 2000).

While the current study agrees with incorporation of traditional principles of teeth setting in assessing and rehabilitating smiles it also differs on the aspect of teeth being stereotypically selected based on the gender. However the results of this study are limited by the fact that the photographs were evaluated by a single person incorporating operator bias. Further research is suggested based on more standardised guidelines to assess the relative position of the anterior teeth.

## **CONCLUSION :**

The study assessed the association between the position shape and prominence of canine with the perception of aesthetics. It was found that there was a statistically significant relation between the vertical position, and the prominence of cusp tip in the perception of aesthetics. This could prove to be a significant input in the process of smile reconstruction. There exists no ideal smile and it is important to obtain balance in all kinds of reconstructive procedures. Further research is encouraged to achieve this goal.

## **AUTHOR CONTRIBUTIONS:**

The primary author contributed to establish the materials and methods and analysed the results followed by manuscript writing.

The co-author verified the results and manuscript before submission.

## **CONFLICT OF INTEREST :**

There is no conflict of interests

## **REFERENCES:**

- [1] Ackerman, J. L. et al. (1998) ‘A morphometric analysis of the posed smile’, *Clinical Orthodontics and Research*, pp. 2–11. doi: 10.1111/ocr.1998.1.1.2.
- [2] Ajay, R. et al. (2017) ‘Effect of surface modifications on the retention of cement-retained implant crowns under fatigue loads: An In vitro study’, *Journal of Pharmacy And Bioallied Sciences*, p. 154. doi: 10.4103/jpbs.jpbs\_146\_17.

- [3] Anderson, K. M. et al. (2005) 'Tooth shape preferences in an esthetic smile', *American Journal of Orthodontics and Dentofacial Orthopedics*, pp. 458–465. doi: 10.1016/j.ajodo.2004.07.045.
- [4] Ariga, P. et al. (2018) 'Determination of Correlation of Width of Maxillary Anterior Teeth using Extraoral and Intraoral Factors in Indian Population: A Systematic Review', *World Journal of Dentistry*, pp. 68–75. doi: 10.5005/jp-journals-10015-1509.
- [5] Ashok, V. et al. (2014) 'Lip Bumper Prosthesis for an Acromegaly Patient: A Clinical Report', *The Journal of Indian Prosthodontic Society*, pp. 279–282. doi: 10.1007/s13191-013-0339-6.
- [6] Ashok, V. and Suvitha, S. (2016) 'Awareness of all ceramic restoration in rural population', *Research Journal of Pharmacy and Technology*, p. 1691. doi: 10.5958/0974-360x.2016.00340.1.
- [7] Basha, F. Y. S., Ganapathy, D. and Venugopalan, S. (2018) 'Oral Hygiene Status among Pregnant Women', *Research Journal of Pharmacy and Technology*, p. 3099. doi: 10.5958/0974-360x.2018.00569.3.
- [8] Bell, R. A. (1978) 'The geometric theory of selection of artificial teeth: is it valid?', *Journal of the American Dental Association*, 97(4), pp. 637–640.
- [9] Bothung, C. et al. (2015) 'Upper canine inclination influences the aesthetics of a smile', *Journal of Oral Rehabilitation*, pp. 144–152. doi: 10.1111/joor.12234.
- [10] Brunzel, S. et al. (2006) 'Aesthetic effect of minor changes in incisor angulation: an internet evaluation', *Journal of Oral Rehabilitation*, pp. 430–435. doi: 10.1111/j.1365-2842.2005.01573.x.
- [11] Calvo, M. G. et al. (2013) 'Attentional mechanisms in judging genuine and fake smiles: Eye-movement patterns', *Emotion*, pp. 792–802. doi: 10.1037/a0032317.
- [12] Chiche, G. J. and Pinault, A. (1994) *Esthetics of Anterior Fixed Prosthodontics*. Quintessence Publishing (IL).
- [13] Clifford, M. M. and Walster, E. (1973) 'The Effect of Physical Attractiveness on Teacher Expectations', *Sociology of Education*, p. 248. doi: 10.2307/2112099.
- [14] Duraisamy, R. et al. (2019) 'Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments', *Implant dentistry*, 28(3), pp. 289–295.
- [15] Faure, J. C. (2002) 'The influence of different facial components on facial aesthetics', *The European Journal of Orthodontics*, pp. 1–7. doi: 10.1093/ejo/24.1.1.
- [16] Felicita, A. S. and Sumathi Felicita, A. (2017) 'Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction – A case report', *The Saudi Dental Journal*, pp. 185–193. doi: 10.1016/j.sdentj.2017.04.001.
- [17] Frush, J. P. and Fisher, R. D. (1955) 'Introduction to dentogenic restorations', *The Journal of Prosthetic Dentistry*, pp. 586–595. doi: 10.1016/0022-3913(55)90084-6.
- [18] Ganapathy, D. et al. (2016) 'Effect of Resin Bonded Luting Agents Influencing Marginal Discrepancy in All Ceramic Complete Veneer Crowns', *Journal of clinical and diagnostic research: JCDR*, 10(12), pp. ZC67–ZC70.
- [19] Ganapathy, D. M., Kannan, A. and Venugopalan, S. (2017) 'Effect of Coated Surfaces influencing Screw Loosening in Implants: A Systematic Review and Meta-analysis', *World Journal of Dentistry*, pp. 496–502. doi: 10.5005/jp-journals-10015-1493.

- [20] Jain, A., Ranganathan, H. and Ganapathy, D. (2017) 'Cervical and incisal marginal discrepancy in ceramic laminate veneering materials: A SEM analysis', *Contemporary Clinical Dentistry*, p. 272. doi: 10.4103/ccd.ccd\_156\_17.
- [21] Jain, R. K., Kumar, S. P. and Manjula, W. S. (2014) 'Comparison of intrusion effects on maxillary incisors among mini implant anchorage, j-hook headgear and utility arch', *Journal of clinical and diagnostic research: JCDR*, 8(7), pp. ZC21–4.
- [22] Johnson, D. L. (1992) 'Retention for a Removable Partial Denture', *Journal of Prosthodontics*, pp. 11–17. doi: 10.1111/j.1532-849x.1992.tb00420.x.
- [23] Jyothi, S. et al. (2017) 'Periodontal Health Status of Three Different Groups Wearing Temporary Partial Denture', *Research Journal of Pharmacy and Technology*, p. 4339. doi: 10.5958/0974-360x.2017.00795.8.
- [24] Kannan, A. and Venugopalan, S. (2018) 'A systematic review on the effect of use of impregnated retraction cords on gingiva', *Research Journal of Pharmacy and Technology*, p. 2121. doi: 10.5958/0974-360x.2018.00393.1.
- [25] Kenealy, P., Frude, N. and Shaw, W. (1988) 'Influence of Children's Physical Attractiveness on Teacher Expectations', *The Journal of Social Psychology*, pp. 373–383. doi: 10.1080/00224545.1988.9713754.
- [26] Kokich, V. O., Asuman Kiyak, H. and Shapiro, P. A. (1999) 'Comparing the Perception of Dentists and Lay People to Altered Dental Esthetics', *Journal of Esthetic and Restorative Dentistry*, pp. 311–324. doi: 10.1111/j.1708-8240.1999.tb00414.x.
- [27] Machado, A. W., Moon, W. and Gandini, L. G., Jr (2013) 'Influence of maxillary incisor edge asymmetries on the perception of smile esthetics among orthodontists and laypersons', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*, 143(5), pp. 658–664.
- [28] Mahshid, M. et al. (2004) 'Evaluation of "Golden Proportion" in Individuals with an Esthetic Smile', *Journal of Esthetic and Restorative Dentistry*, pp. 185–192. doi: 10.1111/j.1708-8240.2004.tb00032.x.
- [29] Monalisa, R. and Jayalakshmi (2016) 'A comparative study on the occurrence of internal voids in composite restoration using different incremental techniques', *Research Journal of Pharmacy and Technology*, p. 1596. doi: 10.5958/0974-360x.2016.00316.4.
- [30] Paiva, T. T. de et al. (2018) 'Influence of canine vertical position on smile esthetic perceptions by orthodontists and laypersons', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*, 153(3), pp. 371–376.
- [31] Peck, S. and Peck, L. (1995) 'Selected aspects of the art and science of facial esthetics', *Seminars in Orthodontics*, pp. 105–126. doi: 10.1016/s1073-8746(95)80097-2.
- [32] Rai, D., Janardhanam, P. and Rai, A. (2015) 'Esthetic factors of smile in vertical dimensions: A comparative evaluation', *Journal of Indian Orthodontic Society*, pp. 25–31. doi: 10.4103/0301-5742.158630.
- [33] Rufenacht, C. R. (2000) *Principles of Esthetic Integration*. Quintessence Publishing (IL).
- [34] Sarver, D. M. (2001) 'The importance of incisor positioning in the esthetic smile: the smile arc', *American journal of orthodontics and dentofacial orthopedics: official publication of the American*

Association of Orthodontists, its constituent societies, and the American Board of Orthodontics, 120(2), pp. 98–111.

- [35] Seluk, L. W., Brodbelt, R. H. W. and Walker, G. F. (1987) 'A biometric comparison of face shape with denture tooth form', *Journal of Oral Rehabilitation*, pp. 139–145. doi: 10.1111/j.1365-2842.1987.tb00703.x.
- [36] Selvan, S. R. and Ganapathy, D. (2016) 'Efficacy of fifth generation cephalosporins against methicillin-resistant *Staphylococcus aureus*-A review', *Research Journal of Pharmacy and Technology*, p. 1815. doi: 10.5958/0974-360x.2016.00369.3.
- [37] Subasree, S., Murthykumar, K. and Dhanraj (2016) 'Effect of Aloe Vera in Oral Health-A Review', *Research Journal of Pharmacy and Technology*, p. 609. doi: 10.5958/0974-360x.2016.00116.5.
- [38] Venugopalan, S. et al. (2014) 'Magnetically retained silicone facial prosthesis', *Nigerian journal of clinical practice*, 17(2), pp. 260–264.
- [39] Vijayalakshmi, B. and Ganapathy, D. (2016) 'Medical management of cellulitis', *Research Journal of Pharmacy and Technology*, p. 2067. doi: 10.5958/0974-360x.2016.00422.4.
- [40] Wolfart, S. et al. (2005) 'Assessment of dental appearance following changes in incisor proportions', *European Journal of Oral Sciences*, pp. 159–165. doi: 10.1111/j.1600-0722.2005.00206.x.
- [41] Xu, H. et al. (2015) 'Effect of buccolingual inclinations of maxillary canines and premolars on perceived smile attractiveness', *American Journal of Orthodontics and Dentofacial Orthopedics*, pp. 182–189. doi: 10.1016/j.ajodo.2014.10.029.

## TABLES AND GRAPHS:

	Aesthetic Score					Chi-square	P Value
	Poor	Average	Good	Very Good	Excellent		
Gender Male	0%	17.6%	5.9%	52.9%	23.5%	23.827	0.001
Female	0%	34.3%	45.7%	14.3%	5.7%		
Canine Position At occlusal plane	0%	13.8%	27.6%	34.5%	24.1%	16.296	0.012

Above the occlusal plane	0%	11.8%	23.5%	47.1%	17.6%			
Below the occlusal plane	0%	52.2%	26.1%	21.7%	0%			
Cusp tip	Prominent	0%	0%	22.7%	18.2%	59.1%	20.531	0.006
	Blunt	0%	10.6%	27.7%	40.4%	21.3%		
Cervical Prominence	Absent	0%	35.7%	39.3%	25.0%	0%	12.632	0.001
	Prominent	0%	19.5%	17.1%	39.0%	24.4%		

Table 1: shows the frequency distribution and p value and Chi-square value of correlation of sex, canine position, cervical prominence and cusp tip prominence with respect to aesthetic score. Canine position, at or above the level of occlusion was associated with very good esthetic scores. Prominent cusp tip was associated with excellent esthetics and cervical prominence of canine was also associated with higher esthetic scores.

Aesthetic Score	Frequency	Percentage
Poor aesthetics	0	0%
Average aesthetics	18	26%
Good aesthetics	18	26%
Very good aesthetics	23	33.3%
Excellent aesthetic	10	14.5%

Table 2: Shows the frequency distribution of the aesthetic score

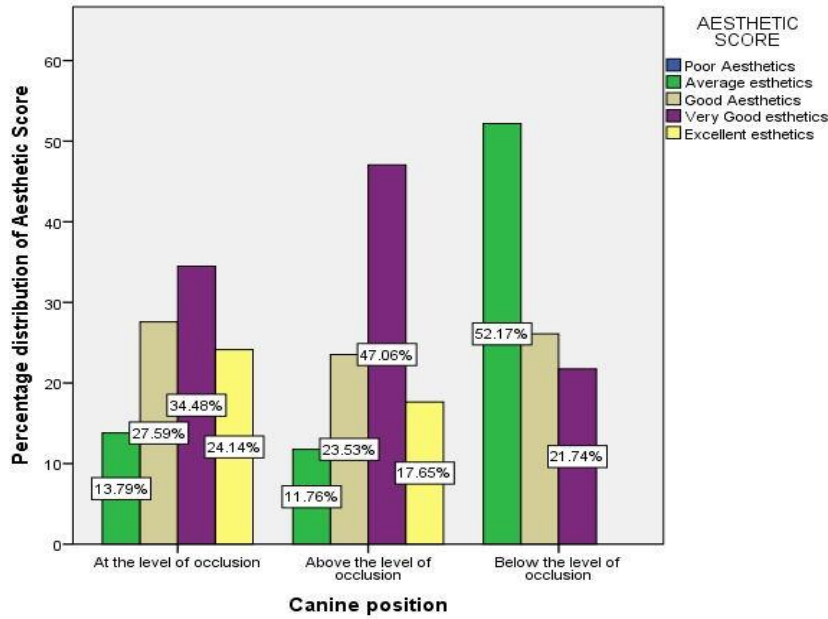


Figure 1: Bar graph showing the relation between the canine position and its effect on the aesthetic score. The X axis represents the three canine positions, At the level, above the level and below the level of occlusion and the Y axis represents the percentage of relation with the aesthetic score. The graph depicts that 'Very good esthetics' (purple) was perceived when the canine was at the level and above the level of occlusion and 'Average esthetics' (green) was seen mostly when the canine was below the plane of occlusion. This relation was found to be statistically significant with Chi-square value 16.296 and p value 0.012 ( $p < 0.05$ ).

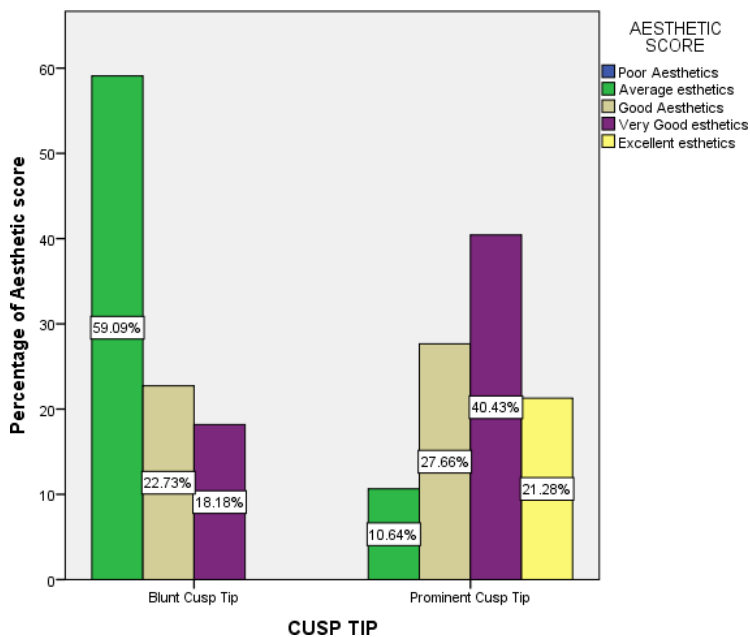


Figure 3: Bar graph depicting the relation between the prominence of cusp tip and the perceived esthetic score. Here the X axis represents the Cusp tip and the Y axis represents the percentage distribution of the aesthetic score. From the graph we can infer that the blunt tip of a canine was mostly associated with average aesthetics (green), prominent cusp tip was associated with very good esthetics (purple). This relation was statistically significant with p value 0.06 and chi square value 20.532.



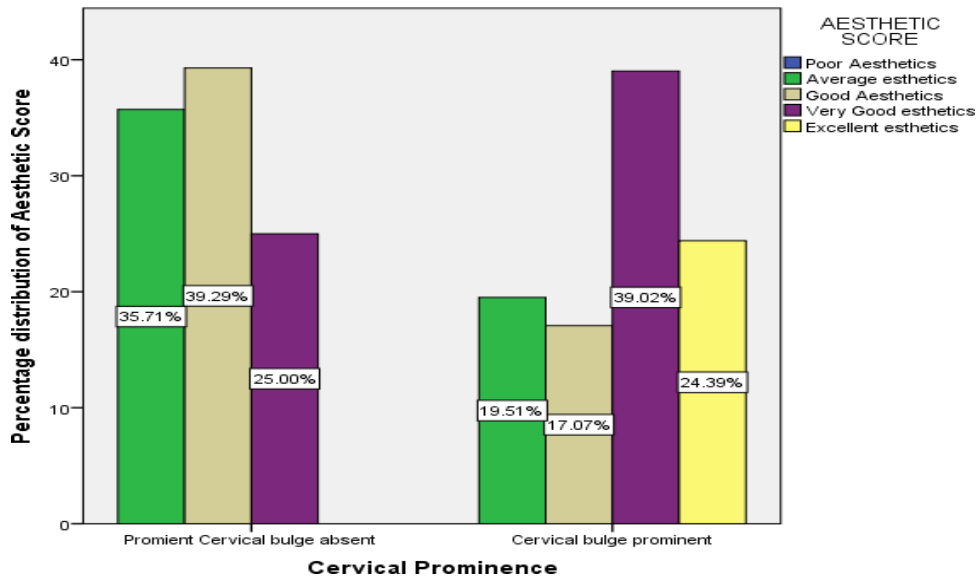


Figure 4: Bar graph depicting the relation between the cervical prominence of canine and the perceived esthetics. The X axis depicts the cervical prominence of the canine and the Y axis represents the percentage distribution of the aesthetic score. We can infer from the graph that a prominent cervical bulge was associated with a very good esthetics(purple ), whereas a not so prominent bulge was associated with average(green) to good esthetics(beige). This relation was found to be statistically significant with p value 0.001 and chi square value 12.632.



Figure 5: Depicts intra oral centric relation. Subjects selected were mandated to have all the maxillary anteriors present with no caries, fractures or restorations. This photo was used to evaluate the canine position in terms of the occlusal plane.



Figure 6: Depicts extra oral smile. Patients belonging to 18-35 years were selected and an extra oral smile photo was used to give an overall perceived esthetic score.