Overview of the Smile Arc in Students of Harapan 1 High School Medan, in 2016

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Abstract: Introduction: In orthodontics, the type of malocclusion that is often complaint by patients are anterior teeth crowding and protrusive teeth which subsequently, affects facial aesthetics. Facial aesthetics is affected by the smile arc of an individual which is distinct in every individual. One of the smile forming components in the frontal aspect is the smile arc. There are three possible smile arcs that are commonly found in individuals; curved, straight and reversed smile arc. Objective: The aim of this study is to determine the overview of the smile arc among Harapan 1 Medan high school students in 2016. Materials and Methods: This was a descriptive study with a cross sectional approach and simple random sampling method was used to select Harapan 1 Medan high school students with a total sample of 126 students. The obtained data was analysed using descriptive statistics. Results: The most dominant type of smile arc among Harapan 1 high school students was the curved smile arc and there were no significant differences between males and females. The distribution of the smile arc type obtained were 69.84% curved, 22.22% straight, and 7.94% reversed. Conclusion: The average smile arc type of Harapan 1 Medan high school students was the curved smile.

1 INTRODUCTION

Malocclusion can disrupt the appearance of individuals and thereby affect facial aesthetics subjectively. In orthodontics, the type of malocclusion that is often complaint by patients are anterior teeth crowding and protrusive teeth. These cases are directly related to the aesthetic aspect that affects the appearance of the patients' face (Dewi, 2008).

Facial aesthetic factors are influenced by the smile arc of an individual which is different in every individual (Dewi, 2008; Gill 2008). According to Sarver, aesthetics in orthodontics is divided into three categories i.e. macro aesthetics (full face), mini aesthetics (smile), and micro-aesthetics (dental and gingival) (Camara, 2010).

Mini aesthetics is defined as the smile aesthetic which includes changes in facial expression involving the eye, as well as the lifting curvature of the lips and the muscles around the mouth. There are two basic types of smile; the social smile (posed smile) and the spontaneous smile (unposed smile) (Al-Johany et al., 2011). Sabri stated that the smile forming component in the frontal aspect consists of several factors; lip line, smile arc, and the buccal corridor (Al-Johany et al., 2011; Sabri, 2005).

Smile arc is the relationship between the occlusal/ incisal plane of the upper anterior teeth with the lower lip during smiling (Sianita, 2015). Machado's research showed that individuals with a curved smile tend to look younger and more confident, while the flattened or inverted smile arc caused the individual to look older and less attractive (Rodrigues et al., 2009; Zaib and Hameed, 2009).

The inclination of the anterior teeth that is less convex causes the smile to become less curved, resulting in a flat or reversed smile arc (Machado 2014; Rodrigues et al. 2009).The shape of the dental arc should match the curvature of the lower lip to obtain the best appearance. This condition can be observed in individuals with a curved smile arc (Gill, 2008; Singla and Lehl, 2014). Incisal edges of the maxillary teeth should be parallel to the lower lip curvature to produce a curved smile arc (Cobourne and DiBiase, 2010; Singla and Lehl, 2014). Many individuals prefer the curved smile arc and believe that the straight smile arc will reduce the beauty of the smile in men and women (Ritter et al., 2006).

According to Rice in 1996, adolescence is a period in which an individual grows into an adult or

develop towards biological, cognitive, and socioemotional maturity (Sabri, 2005; Sianita, 2015). High school students are categorized as late teens as it is in the age range of 15-20 years (Dewi, 2008). The use of orthodontic devices among high school students or late teens had been increasing due to indication or aesthetic reasons (Camara, 2010). This research is expected to provide an overview of the aesthetic smile arc in normal Angle Class I molar occlusion.

2 MATERIALS AND METHODS

This was a descriptive study with a cross sectional approach to study the smile arc among Harapan 1 Medan high school students in 2016. The sample size was determined by using the population proportion interpretation formula with absolute accuracy. Through this method, the minimal sample size was obtained with an absolute precision required to determine the proportion of individuals with specific characteristics in a population. Furthermore, the estimated sample size was calculated based on the sample proportion of a previous study with a similar methodology to this study which was 81,69% (P=0,8169).

Based on the calculation, the subjects for this study were 126 students with several inclusion criteria, such as: the high school students of Harapan 1 Medan aged ≥ 15 years, no dental abnormalities, no history of orthodontic treatment, complete permanent dentition (up to M2), Angle Class I molar relationship, normal overjet and overbite (2-4 mm, measured with a caliper and ruler) and presence of mild crowding ≤ 2 mm (measured with a caliper and ruler).

Subjects were instructed to pose a social smile by saying "cheese" for a period of time (± 3 seconds). Photographs were taken three times with a Fuji S1500 camera and the best photos that fit the criterias were selected. After collecting the photograph, the photo was then analyzed with the Adobe Photoshop CS3 program to create the smile arc using dotted line. The observed component was the smile arc. The photo observation was conducted using Machado method by drawing a line from the highest point of the 1st region canine cusp to the 2nd region canine cusp.

The obtained data was analyzed using descriptive statistics to evaluate the frequency and percentage of the various smile arcs among Harapan 1 High School students.

Before conducting this research, ethical approval was obtained from the University of North Sumatera Health Research Ethics Committee.

Figure 1: Types of smile arc: (A) curved smile arc, (B) straight smile arc, and (C) reversed smile arc (Singla and Lehl, 2014). Info: blue dotted line represents the smile arc, yellow dotted line represents the low lip line.

3 RESULTS

The results of the analysis of the photographs, were as follows:

Table 1: Distribution of the smile arc in high school students of Harapan 1 Medan.

Number.	Type of smile arc	Amount (n=126)	Percentage (%)
1.	Curved	88	69.84
2.	Straight	28	22.22
3.	Reversed	10	7.94

Table 2: Distribution of the smile arc based on gender in high school students of Harapan 1 Medan.

Number	Type of smile arc	Male		Female	
		Amount (n= 63)	Percentage (%)	Amount (n= 63)	Percentage (%)
1.	Curved	31	49.21	57	90. 47
2.	Sraight	23	36.51	5	7.94
3.	Reversed	9	14.28	1	1.59

Curved smile arc type presents the highest percentage in males (49.21%) and in females (90.47%) followed by straight smile arc type in males (36.51%) and females (7.94%). Type of smile arc with the smallest percentage was the reversed smile arc in males (14.28%) and females (1.59%).

4 DISCUSSION

Smile is an important expression in emphasizing an attractive facial feature. An attractive or delightful smile can make an individual more confident in his/her social environmental (Singla and Lehl, 2014). Creating an attractive and delightful smile involves a harmonious relationship between the teeth, gingiva, and lips (Sachdeva et al., 2012). An attractive and balanced smile is one of the main goals of orthodontic treatment, mainly due to the increased awareness of the importance in having an attractive smile among teenagers (Singla and Lehl, 2014). Smile analysis and smile design has become a key element in diagnosis and orthodontic treatment planning since the last decade (Sachdeva, et al. 2012).

The results of this study showed that the most common type of smile arc found among students was the curved smile arc (69.84%) and the second highest was the straight smile arc 22.22% (Table 1). The results of this study was similar to the research conducted by GC Cruz which presents curved smile arc found in 94,4% males and females and non curved smile arc in 5.6% of the population (Cruz, Lopez and Rodriguez, 2015). Research by Ridal in Gowa presents 47.2% with a curved smile arc (Ridal, 2014). Mahfouz MN conducted a study on Palestine adolescents aged 12-17 years, and found 75.8% had a curved smile arc (Mahfouz, Hussein and Dogan, 2009). Furthermore, a study by Parekh H, in India found curved smile arc in 72% females, and 62% males (Parekh et al., 2013).

Smile arc of Harapan 1 Medan high school students based on gender was the curved smile arc in 49.21% of male students and 90.47% of female students followed by the straight smile arc in 36.51% male students and 7.94% female students while the reversed smile arc was found in 14.28% male students and 1.59% female students (Table 2). This result was similar to the research of Sabri and Balani, which stated that the curved smile arc was more likely to be found in women than men (Sabri, 2005). Overall, 45,6% male students of Harapan 1 Medan high school tend to have a curved smile arc, followed by straight smile arc of 36.51%, and reversed smile arc of 14.28%.

The shape of every individuals' smile arc is different and is influenced by the shape of the maxillary arc (Camara, 2010). The maxillary arc of the subjects, especially at the anterior region, greatly affects the curvature of the smile arc. The wider the maxillary arc, the smaller the curvature of the anterior region, hence creating a more straighter smile (Sabri, 2005). 69.84% of the research subjects had the curved

smile arc type, thus they were categorized as having the ideal smile. One substantial factor that may had influence the high number of curved smile arc among subjects in this study was probably due to the tilting of the maxillary occlusal plane in relation to the Frankfort plane, as this would had increased incisor display and tend to produce a curved smile (Bahirrah and Sitorus, 2015). Furthermore, the study by Sabri stated that the smile arc in women were found to be more convex compared to men due to differences in the development of the facial musculature (Sabri, 2005).

5 CONCLUSION

The most dominant smile arc type in high school students of Harapan 1 Medan was the curved smile arc. The distribution of smile arc type was 69.84% curved, 22.22% straight, and 7.94% reversed.

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REFERENCES

Al-Johany, S.S., Alqahtani, A.S., Alqahtani, F.Y., Alzahrani, A.H., 2011. Evaluation of different esthetic smile criteria. *International Journal of Prosthodontics* 24, 64-70.

Bahirra, H.S., Sitorus, O., 2015. Smile analysis with photometric methods of Malaysian Indian Tamil Dentistry students at University of Sumatera Utara. *Dentika Dental Journal* 18(3), 268-73.

Camara, C.A., 2010. Aesthetics in orthodontics: Six horizontal smile lines. *Journal of Orthodontics Dental Press* 15(1), 118-31.

Cobourne, M.T., DiBiase, A.T., 2010. *Handbook of orthodontics*. Mosby. London, 1st edition.

Cruz, G.C., Lopez, A.F., Rodriguez, F.M., 2015. Association between the smile arc and buccal corridors with the facial biotype in subjects with normocclusion. *Revista Mexicana de Ortodoncia* 3(1), 8-12.

Dewi, O., 2008. Analisis hubungan maloklusi dengan kualitas hidup pada remaja SMU kota Medan. USU. Medan, Tesis. 107.

Gill, D.S., 2008. *Orthodontics at a glance*. Blackwell. London, 1st edition.

Machado, A.W., 2014. 10 commandments of smile esthetics. *Journal of Orthodontics Dental Press* 19(4), 136-57.

Mahfouz, M.N., Hussein., Dogan, A., 2009. Smile arc in Palestinian adolescents. *Turkish Journal of Orthodontics* 22, 210-17.

Parekh, H., Patel, D., Mehta, F., Joshi, N., Bhattacharya, A., 2013. Smile, a diagnostic tool: Photographic analysis in adult Gujerati population. *IOSR Journal of Dental and Medical Sciences* 12(4), 39-46.

Ridal, N.I., 2014. Hubungan antara bentuk wajah dengan komponen senyum pada suku Makassar di kabupaten Gowa. *Jurnal Kedokteran Gigi Universitas Hasanuddin* 2, 7-17, 24-31.

Ritter, D.E., Gandini, L.Z., Pinto, A., Ravelli, D.B., Locks, A., 2006. Analysis of the smile photograph. *World Journal of Orthodontics* 7, 279-85.

Rodrigues, C.D.T., Magnani, R., Machado, M.S., Oliveira, O.B., 2009. The perception of smile attractiveness. *Angle Orthodontics* 79(4), 634-8.

Sabri, R., 2005. The eight component of a balanced smile. *Journal of Clinical Orthodontics* 39(3), 155-67.

Sachdeva, K., Singla, A., Mahajan, V., Jaj, H.S., Negi, A., 2012. Esthetic and smile characteristics at rest and during smiling. *Journal of Indian Orthodontics Society* 46(1), 17-25.

Sianita, P.P., 2015. Senyum percaya diri pada pasien dengan maloklusi klas III. In FORUM KOMUNIKASI ILMIAH III, Proceeding of the Pathway to Reach Higher Competency Through Science and Technology in Dentistry, Indonesia. 95-105.

Singla, S., Lehl, G., 2014. Smile analysis in orthodontics. *Indian Journal of Oral Science* 5(2), 49-54.

Zaib, F., Hameed, W., 2009. Effect of buccal corridors width on smile esthetics. *Pakistan Journal of Orthodontics* 1(1), 1-5.