# **Comparision Of Dental Arch Form Based On Lineage**

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**Abstract:-** Background: Basically the size and shape of the dental arch is determined by the cartilaginous skeleton of the maxilla and the mandible during fetal life, then progresses to follow the growing teeth and jawbone. Genetic influences are very strong in the development of the arch form and the relationship of the face and jaw.

Aim : To know comparision of dental arch form based on lineage.

**Method:** This is a cross sectional study that carried out on 20 families. Each family consists of father, mother and their child (boy or girl). The maxillary and mandibular impression are drawn using alginate impression material and appropriate metal tray for all sample. A child's dental arch form corresponding to one of his parents is recorded. The data obtained were processed using contingency coefficient test and chi-square test.

**Result:** Dental arch form of the child's dental arch form appears to resemble the parent's arch form, especially in this study found the dominant curvilinear arch form of the ovoid arch in the mother-daughter relationship whereas the square dental arch form in the father-son relationship. Statistically, this relationship is significant (p < 0.05).

**Conclusion:** The suitability of the dental arch form found in children with their parents in this study is influenced by genetic factors.

Keywords:-Dental arch form, lineage.

# I. INTRODUCTION

One of the organs that play an important role in supporting the body's metabolism is the tooth. Teeth composed of the jawbone form a naturally different arch structure, in terms of size and shape that are influenced by the shape of the bone supporting the dental arch, eruption, and damage to the teeth. Basically the size and shape of **No index entries found**.develops following the tooth seed and the growing jawbone. During the postnatal period, the environmental forces acting on the dental crown affect the size and shape of the dental arch. Change of dental arch at the time of growth, very influenced by growth of flower of alveolaris process.<sup>1</sup>

In orthodontic treatment the dental arch is a major factor for achieving good occlusion in a harmonized arch based on an increase in the length and width of the jaw arch form associated with dental development and involves the alveolar process. Genetic influence is very strong on the development of shape and the relationship of face and jaw. Some researchers suggest that the stability of the shape and size of the mandibular arch is a stability factor of the treatment outcome.<sup>3,4</sup>

The dental arch consists of the maxilla (maxilla) and mandible (mandible). Dental arch differs in each individual, because it is influenced by environment, nutrition, genetics, race, and gender. The dental arch has a close relationship with the shape of the head. The majority of researchers recognize that there is variability in the size and shape of the human arch form. There are several classifications but in general there are three basic curved shapes: tapered, ovoid, and square arch form. Some researchers believe that occlusion and arch form are determined by the interaction between genetic factors and external environmental factors.<sup>3,4</sup>

The line connecting the point of contact between the teeth one to the other is called the dental arch. The dental arch is supported by every tooth located within a bone base. The curved shape based on the anterior part of the curve is categorized into three, namely ovoid, tapered, and square. The three curved shapes have a high enough resemblance that is difficult to distinguish.<sup>1</sup>Therefore, this study aims to see the shape of the jawbone arch based on lineage.

# II. MATERIALS AND METHODS

This research is an observational research with cross sectional study design. Sample collection was conducted at RSGM Hasanuddin University. This research was conducted in May-June 2017.

The sample of this study was selected from the students of dental professors of Hasanuddin University registered at RSGM Hasanuddin University using convenience sampling method. The sample of this research is the student of dentistry profession of Hasanuddin University and parents of dental profession students of

Hasanuddin University who are willing to be used as research sample, amounting to 20 family pairs, every 1 pair of family consisting of 1 father, 1 mother and 1 child. The sample of the study was chosen according to the study criteria, namely:

1. Inclusion criteria

1.1 Student of Faculty of Dentistry Unhas with his parents who are willing to print his jaw.

1.2. Have a complete tooth from the central incisive up to the second molar of the left and right regions of the upper and lower jaws.

2. Exclusion criteria

2.1. Have used orthodontic appliance or are using orthodontic appliance.

2.2. Wearing a denture

Assessment criteria were performed by observing the shape of the jaw arch that is printed on the positive sample jaw sample model. The shape of the jaw arch is assessed based on Arch form templates (orthoformTM, 3M, Unitek, CA, USA) that have been classified by the researchers essentially categorized into three forms, namely tapered, ovoid, and square. Here the classifications pictures (Figure 1):<sup>4</sup>

## III. RESULTS

A study has been conducted on the arc of the jaw based on the offspring among the families of the students of the Dentistry Faculty. The following is the result of the distribution of the research samples based on the shape of the maxillary and mandibular arches performed on a sample of 20 families each consisting of the upper and lower jaws of the father, mother and child are shown in the following table:



Table 1 shows that the shape of the upper and lower jaw arches is identical. The upper and lower pat arches of the father are at most Ovoid (45%), the least being tapered (20%). The upper and lower maternal curvature of the mother is at most Ovoid (80%), at least tapered (10%). The upper and lower jaw curvature of the child is Ovoid (55%), the least being tapered (20%).

	Table 1. Sample Distribution Research based on the shape of the upper Jaw and lower Jaw			
<b>Table 1.</b> Sample Distribution Research based on the shape of the upper jaw and lower jaw				

Families	Maxilla					
	Ovoid n (%)	Square n(%)	Tapered n(%)	Ovoid n(%)	Square n(%)	Tapered n(%)
Father(n=20)	9 (45)	7 (35)	4 (20)	9 (45)	7 (35)	4 (20)
Mother(n=20)	16 (80)	2(10)	2(10)	16 (80)	2(10)	2(10)
Child(n=20)	11 (55)	5(25)	4 (20)	11 (55)	5(25)	4 (20)

Figure 2 shows that the hssil shape of the upper and lower jaws is equal. The upper and lower paternal curvature of the father-daughter is Ovoid (45%), the father-child square shape (25%) is at least tapered (15%). The upper and lower mother artery-shaped arch shape is Ovoid (55%), the square-mat mother shape (10%), similar to the tapered jaw arch shape (10%).



Fig 2. Distribution chart of ovoid jaw shape, square, and tapered jaw between father-son and mother-daughter

Table 2 shows that the contingency coefficient value of the upper and lower arch shape of the father and the child is 0.734 with (p value = 0,000), whereas between mother and child equal to 0.658 with (p value = 0.004). This is statistically significant.

No	Arch form	Families	Contingency coeficient	P Value
1	Maxilla	Father and Child	0,734	0,000*
		Mother and Child	0,658	0,004*
2	Mandible	Father and Child	0,734	0,000*
		Mother and Child	0,658	0,004*

Table 2. Contingency	coefficient shows	correlation o	of jaw arch	form among	the samples

\* $p \le 0.05$  (Signicant)

Table 3 shows that the mean length of the upper teeth arch of the child is more likely to approach the average length of the upper teeth arch of the mother in the shape of the ovoid jaw arch with p value of 1.00 which means that there is no difference in the length of the jaw arch between mother and child as well as tapered with p value 0.272, but in the jaw square.

Arch form of	Long Arch	Mean	Std.	Difference	Р
Maxilla		(cm)	Deviation		Value
Ovoid	Father long arch maxilla	11.76	0.90	0.56	0.148
	Child long arch maxilla	11.21	0. 62		
	Mother long arch maxilla	11.10	0.73	0.00	1.00
	Child long arch maxilla	11.10	0.67		
Square	Father long arch maxilla	11.56	1.14	0.10	0.854
	Child long arch maxilla	11.46	1.19		
	Mother long arch maxilla	11.15	1.20	0.85	0.366
	Child long arch maxilla	12.00	1.97		
Tapered	Father long arch maxilla	12.87	0.47	1.20	0.102
	Child long arch maxilla	11.67	0.40		
	Mother long arch maxilla	12.35	0.64	0.55	0.272
	Child long arch maxilla	11.80	0.28		

Table 3. Results of comparison of the length of the arch length of the Upper Mother's Father, Mother and Child
based on the curved shape

**Table 4.** The result of comparison of the average length of the dental arch of the lower jaw of Father, Mother and Child based on a curved shape

Arch form Mandible	Samples	Mean	Std. Deviation	Difference	P Value
Ovoid	Father long arch mandible	10.87	0.50	0.90	0.003
	Child long arch mandible	9.97	0.53		
	Mother long arch mandible	10.01	0.62	0.04	0.698
	Child long arch mandible	9.97	0.58		
Square	Father long arch mandible	10.88	0.57	0.62	0.101
	Child long arch mandible	10.26	0.63		
	Mother long arch mandible	10.35	1.06	Cannot be	Cannot be
	Child long arch mandible	10.55	1.06	computed	computed
Tapered	Father long arch mandible	11.53	0.15	0.90	0.130

Table 4 shows that the mean length of the upper teeth arch of the child is more likely to approach the average length of the upper teeth arch of the mother in the shape of the ovoid jaw arch with a value of 0.698 p, which means no difference between mother and child as well as tapered with p value 0.795, but on jaw shape square long curve of the maxillary teeth of the child is more likely to approach the average length of dental arch with p value of 0.101.

Table 5 shows that the compatibility of the maxillary intercurrent teeth between the father and the child is 0.941 and the mandibular teeth is 0.887. Whereas, the maxillary intercellular teeth between mother and child were 0.957 and the lower teeth were 0.934. This indicates that the level of intercontinence of the child in the upper jaw is high in the mother (95.7%) while the intercanine level of the lower jaw is also higher in the mother (93.4%).

Child	Father		Mother		
	r	Р	r	Р	
Maxilla	0,941	0,000	0,957	0,000	
Mandible	0,887	0,000	0,934	0,000	

Table 5. Inter-canine correlation test of upper and lower jaws of parents and children

<b>Table 6.</b> Intermolar width correlation test on upper and lower Jaws of parents and children							
Child	Father		Mo	ther			
	r P		r	Р			
Maxilla	0,944	0,000	0,966	0,000			
Mandible	0,947	0,000	0,906	0,000			

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Table 6 shows that the maternal maximal intermediate tooth fit between the father and the child is 0.944 and the lower teeth are 0.947. While the maximal intercostal tooth inter tooth between mother and child is 0.966 and lower jaw teeth is 0.906. This indicated that the maximal molar intercourse level of children in the upper jaw was higher in the mother (96.6%), whereas the inter-molar level of the child in the lower jaw was higher in the father (94.7%).

Based on the origin of the sample family tribe (Fig. 3 to 5), it can be seen that there is a prominent relation between father, mother, and child in each jaw arch shape. In the ovoid shape of the ovoid jaw in which the number of children with ovoid jaw shape is almost equal to the number of mothers with ovoid jaw shape, it can be said that the ovoid jaw shape of the child tends to follow the arch shape of the mother's jaw. In (Figure 4) the shape of the square jaw arches with the naked bugis and non-bugis number of children who have square jaw square shape almost equal to the number of fathers who have a square jaw shape, it can be said that the jaw square arch shape of the child tends to follow the form arch of his father's jaw.





Fig 3. Ovoid jaw shape diagram between father, mother and child based on Bugis and Non-Bugis (n = 20).





Fig 5. Graphical representation of Tapered jaw arch shape between father, mother and child based on Bugis and Non-Bugis (n = 20).



**Fig 6.** Graphical overview of jaw arch shape The same between father-child and mother-child based on Bugis and Non-Bugis (n = 20)







**Fig 8.** Graphical images of the same Tapered jaw shape between father-son and mother-daughter based on Bugis and Non-Bugis (n = 20)

Based on the similarity of jaw-shaped attachment forms between father-son and mother-child according to the tribe (Fig. 6 through Fig. 8), a significant relationship exists in the father-daughter relationship in the shape of the ovoid, square, tapered jawbone of Bugis, as well as with non-bugic tribe there is a similarly significant relationship between father and son in the shape of the jaw arches Ovoid, square, tapered, whereas in other patterns there is no significant relationship, either in the Bugis tribe family again or who non-Bugis tribe

## IV. DISCUSSION

Several studies have reported on the shape of the jaw arch and some researchers have tried to examine the shape of the jaw arch based on offspring and ethnicity. There are several forms of classification but in general there are three basic curvature forms namely ovoid, square and tapered. This research was conducted with the aim to know the shape of the jaw arch according to heredity based on the bugis and non-bugis students of Hasanuddin University's dentistry profession.

The results of this study on the shape of the upper and lower jaws of the father, mother, and child as seen in table 1, the study of father, mother and child who mempuyai ovoid jaw shape more than square and tapered. This is in accordance with research conducted by Othaman SA et  $al^4$  and Owais AI et  $al^{13}$ . However, in a study conducted by Hedayati Z et  $al^9$ , which has a tapered form of the study more than the shape of ovoid and square jaw arches, whereas research conducted Lee et  $al^{14}$  find more square jaw square shape followed by ovoid and tapred. This difference can be attributed to the characteristics of the tribe and population of the sample under study.

In terms of heredity in Figure 1 it can be concluded that the tendency of children to follow the shape of ovoid jaw arches of the father and mother who have a percentage of mother-child 55% higher than father-son 45%, but on the results of contingency test correlation in table 2 between father- children and mother-children have a strong relationship between the two. This is in accordance with the research of Othaman SA et al<sup>4</sup> and Owais AI et al<sup>13</sup>.

The length and width of the maxilla and maxillary arch of each individual varies. If we look at the results of the research in Table 3, the results of the average length of dental arch in the father, mother, and child based on the shape of the ovoid jaw, square, and tapered jaw in the upper and lower jaws show that the average length of the dental arch more likely to follow the average length of dental arches of the father, mother and child. However, at the length of the upper teeth arch based on the square jaw square shape the child is more likely to follow his father seen from the large average length of the curve of his teeth. This suggests that the length of the dental arch between the father and mother is different, if the father and mother are seen by sex and the difference in the mean size of the results of the above study is consistent with Raberin et al<sup>16</sup> that the size of the dental arch form has a significant difference between males and females , the male has a larger width of the dental arch than the female.

Based on intercellular width correlation and inter-molar intercellular correlation test on upper and lower jaws of parent and child indicated in Table 5 and Table 6 that there is a suitability of inter-canina width and inter-molar width of the maxilla and jaw down between the child and his or her parents. At intercellular and maxillary intermolinary widths the level of conformity is more prevalent in the mother, whereas the level of

maternal interferences of the lower jaw is more prevalent in the father. According to Mendel's theory, each of the genes of the parents will be passed on to the child. The child will exhibit one of the dominant parental traits because it can be due to one of the genes of the predominant parent compared to the other that is successfully derived.<sup>7</sup>

In figures 2 to 4 are graphical images of ovoid, square, and tapered jaw shape based on the fathers, mothers, and children of the bugis and non-bugis. The dominant shape of the jaw arch in the father and the mother of the bugis is the shape of the ovoid jaw arch, the shape of the arch of the jawbone of the non-bugis-tipped father is square form. Research on the shape of the jaw arches based on Turkish and North American tribes is also done by Celebi AA et al<sup>15</sup>. The picture 5 to 7 tells the suitability of the shape of the jaw arch that is lowered by the parents bugis is the shape of the ovoid jaw arch, whereas the non-bugic tribal suitability of the jaw arch shape is found in the father-child with the square jaw square shape.

According to Mendel's genetic theory, each gene of the parent will be passed on to the child. The child will exhibit one of the dominant parental traits because it may be due to one of the genes of the predominant parent compared to the other that was successfully derived.<sup>17</sup> According to two layer theory, there are two racial migrations to Indonesia through the Asian continent, the Austromelanesoid race and the Mongoloid race . The first mixing between the Austromelanesoid race and the Mongoloid race is called the Proto Melayu (Old-Malay) group. The descendants of this group are Toraja (South Sulawesi), Sasak (West Nusa Tenggara), Dayak (Central Kalimantan), Nias (North Sumatera), Mentawai, Baduy tribe, Batak tribe (North Sumatera) and Kubu tribe (South Sumatera). The second mixing between Proto Malays and the Mongoloid race is called the Deutro Melayu group (Malay Youth). These include the Acehnese, the Minangkabau (West Sumatra), the Sundanese, the Javanese, the Balinese, and the Bugis and Makasar.<sup>18,19</sup>

Bugis tribe is one of four tribes that originally inhabited South Sulawesi. As reported by Yusuf et al19, the genetics of this tribe are almost the same as the other tribes although differing geographically and culturally. The Bugis tribe inhabits almost the entire southern plains and hills. Culture is stored in ethnicity (ethnic), contained in it elements and social aspects that differentiate with other tribes. According to the views of the Makassar tribe the ideal marriage marriage consideration of the cultivation (siratang) issue is equal in social standing. Cash is a parallel and equal relationship that will not cause a shock in society, marriage is the ideal marriage, consideration in finding a mate in the environment of its main relatives in the environment of relatives who are in the horizontal line or still within the scope of the family.<sup>20</sup>

#### V. CONCLUSION

The findings of this study indicate that the shape of the jaw arch based on heredity and bugis / nonbugis tribe there is suitability of jaw arch shape between parent and child. In the jaw arch shape between mother and child more dominant curved shape ovoid jaw, whereas in the shape of the jaw arches father and son more dominant square arch shape jaw.

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