RESEARCH ARTICLE

RELATION OF FACE-FORM ON ATTRITION OF TEETH – A COMPARATIVE ANALYSIS.

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Manuscript Info	*Abstract*
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Introduction: Attrition is related to the hardness of the tooth. The masticatory forces generated during various functional and para functional contacts between the opposing teeth. Masticatory forces are related to the form and function of the masticatory organ. The amount of masticatory forces is the product of the mechanical efficiency of the jaw systems and the size and bulk of the jaw muscles. The size and contour of the dento-facial complex dictates the shape of the face. Therefore the amount of masticatory forces will vary along with different types of face form.

Aim: To determine the relationship between attrition and different types of face-form.

Materials and methods: A total number of 1947 subject of the age group ranging from 18 to 45 years of both sexes with all natural teeth were included. These subjects had no history of orthodontic treatment. All the subjects were clinically examined for attrition and face-form.

Results: The data collected, tabulated and statistically analyzed using Chi Square test. The value of the Chi square computed was much less than chi- square critical.

Conclusion: The result was statistically significant and a definite relation was established between the face-form and the attrition of teeth.

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Introduction:-
Strong teeth and jaws were the main survival tools for early man. The teeth were used not only for mastication of food, but also were important in self-defense, show of aggression and mate selection. Universally, the most common cause of destruction of teeth substance and their regressive changes include attrition, abrasion and erosion. J. J. Pindborg has defined "attrition" as "gradual and regular loss of tooth substances due to masticatory forces. Attrition is dependent upon the hardness the tooth and the masticatory forces" [1-4]. It is known that hardness of the teeth varies with alteration of the composition of the enamel and dentin found in various pathological conditions. Clinically this can be identified by the color or texture of the teeth. Attrition can be differentiated from abrasion and erosion by clinical features and relevant dental history of the etiological factors[5] .The dysfunctional habits, non masticatory habits, clenching and gnashing are a long lasting contact between the opposing teeth. Presently these habits are termed as parafunctional habits. Numerous systemic and local factors are responsible for attrition. H.

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Sicher believes that, "masticatory forces cause attrition which is related to the functions and form of the jaws. It was observed that during the growing years, environmental factors effect the growth of the mesenchymal cells. All the components of dentofacial complex are developed from mesenchymal cells [6]. Therefore it can be argued that the changes in environment during the growing phase will affects the face-form. The variation in size, position, form and proportion of the different structures, which compose the dentofacial complex are the responsible for different face patterns.

The cause of attrition is variable. Muscle is under optimum function when there is contact between the teeth of opposing arches[7-10]. This is done by closing the mandible by activation of the muscles of mastication. D. H. Enlow demonstrated a relationship between the bones and muscle of the face during their masticatory functions. According to Enlow's concept, the amount of masticatory force is the product of the mechanical efficiency of the jaw system and the size and bulk of the jaw muscles[7]. Relatively larger and bulkier musculature will produce more masticatory force. Growth of the craniofacial complex varies with the growth of mandible. Mandibular growth is influenced by the muscle of mastication, especially the masseter. Thus keeping the size and bulk of the muscles constant, the masticatory forces will vary with face form. The size and bulk of the same plays a definite role in alteration of the faceform[8-14].

The aim of the dentist is to maintain, restore and correct the function of the somatognathic system. Attrition is universal for every one and at all ages. However there are few studies to establish a relation between attrition and face form.

The aim of the study is to correlate face-form and the degree of tooth attrition.

Materials And Methods:-
Criteria of Subject selection (inclusion and exclusion criteria):-
Male / female within the ages of 18 to 45 year having normal health were selected.
All subjects had the full complement of permanent teeth other than the third molars. Subjects with Malocclusions / orthodontically treated / with any form of restorations were not included.

Sample size: One thousand nine hundred and forty seven subjects were chosen from the outdoor department, students and staff of Dr. R. Ahmed Dental College & Hospital, Kolkata (India).

Procedure: Seated comfortably on a dental chair, the degree of attrition of the subject's teeth was assessed and recorded using the tooth wear index developed by Smith and Knight[9].

Classification of Attrition
0 = No attrition (Fig. 5)
1 = Attrition of enamel but cusp can be identified (Fig. 5)
2 = Dentine exposed (Fig. 6)
3 = Occlusal relief is worn away, enamel rim visible on periphery (Fig. 7)
4 = Crown worn down to column dentine (Fig. 7)

Data collected form all teeth was tabulated. The total attritional score of a subject was calculated by adding up the data. The sum total was divided by 28 (number of teeth in each subject) to get the degree of attrition of every single subject.

Dr. H. P. Bimler's sub-orbital facial types, "Euryprosopic, Mesoprosopic and Leptoprosopic" were used to grade the face – from of every subject. Face-from was determinated by making reference points on the Nasion, Gnathion, Mid- point of the Tragus of both left and right ears. A marking pencil was used for this purpose.

"H" (Fig.1) denoted the distance between the nasion and gnathion. "L" denoted the distance between the midpoint of the tragus of the ear on both sides. Measurement was done using a Vernier slide Caliper (Fig no.2). A standardised Caliper from a reliable manufacturer having range of 0 – 30 cms. Was done by attaching two metallic extensions to the beaks of the calipers. This was helpful in measuring inter – tragal distance along the Frankfort horizontal plane (Fig no.3).

Dr. Bimler used the ratio of vertical (H) and horizontal (L) components of the face for determining the face – form. This was calculated using the equation H/L x 100.

1. Value more than 90 - Leptoprosopic
2. Value less than or equal to 84.9 - Europrosopic
3. Value in – between 85 and 89.9- Mesoprosopic

Data obtained was tabulated and statistically analyzed.

Results:-

Table 1:- Mean degree of attrition in the subjects according to face-form.

Code No	Face-form	No of Subjects	Sum of Attrition Score	Mean Attrition Score	Mean Degree of Attrition	Standard deviation
1	Euryprosopic	456	11,458	25.128	0.397	0.021
2	Leptoprosopic	48	649	13.520	0.482	0.0347
3	Mesoprosopic	1443	47,177	32.693	1.167	0.0785
	T O T A L	1947	59,284	30.448	1.087	

Table 2:- Frequency distribution table of face-form and mean degree of attrition. (with a random sample of size 122, Graphically shown in Fig.no 9,10,& 11)

Face-form	Mean degree of Attrition level					Total no of Subject	Percentage
	0-0.5	0.5-1	1-1.5	1.5-2	More than 2		
Euryprosopic	7	10	8	3	0	28	23
Leptoprosopic	2	1	-	-	-	3	2
Mesoprosopic	11	23	34	9	14	91	75
TOTAL	20	34	42	12	14	122	100

Table 3:- Two way contingency table between mean degree of attrition level and face-form (with a simple random sample of size 122, where f_o is observed frequency & f_e is expected frequency in a cell).

Face-form		Mean Degree of Attrition level		Total
		0 – 1.5	1.5 – 3.0	
Euryprosopic & Leptoprosopic	f_o	25	6	31
	f_e	24	7	
Mesoprosopic	f_o	71	20	
	f_e	72	19	91
TOTAL		96	26	122
Statistical Analysis Chi - square Critical (X^2) and Chi-square compound		= 6.635 = 0.24		

Discussion:-

Large number of samples (1947) have been involved in the study to minimise the deviation in results. Broca's classification of attrition has been used to determine the degree of the attrition of the teeth.

The mean degree of attrition of the subjects with different face-form are displayed in table no. 1. The score of mesoprosopic subjects is significantly higher with value 1.167 (SD 0.0785) and lowest in Leptoprosopic with value 0.482 (SD 0.0347). To analyse the relationship between degree of attrition and different types of face-form statistically, a simple random sample without replacement is drawn for a size of 122 subjects out of total sample of 1947 and results are tabulated in table no. 2. From this table it is observed that 75% subjects have mesoprosopic and their degree of attrition level varies from 0 to 3 [Fig.no.9], Leptoprosopic face-from is very rare with only 2% and their degree of attrition level lies between 0 to 1 [Fig.no.10] about 23% of the subjects possess euryprosopic type of face-form and their score remains between 0 to 2 [Fig.11].

It is found that the score of the mesoprosopic is 1.5 times more than euryprosopic and 2.5 times more than the leptoprosopic type of the face form. This result was in the favour of Weinberger et al in 1955 who also concluded that the attrition has a direct relationship with the face contour and it will be highest in round and square type of the face form.[5, 15-18]

Now for statistical analysis, out of the total sample of 1947 subjects a simple random sample of 122 without replacement is selected and is tabulated in the table no 3 for two way contingency table between mean degree of attrition and the face-form of the subjects. Where f_o is observed frequency in a cell and f_e is the expected frequency. In this study Chi-square test was performed by calculation of Chi-Square critical and Chi-Square compounded. In this table it is observed that Chi-square computed (0.24) is much less than Chi-square critical (6.635) value. Thus it helped to accept the hypothesis that the degree of attrition is dependent upon the face-form of the subjects.

Conclusion:-

This study was conducted among the students, staff and patients of Dr. R. Ahmed Dental College, comprising of 1947 subjects having normal health and dentition in age range 18 – 45. The ratio between male and female was being 52:48. Attrition of the teeth was determined using Broca's classification of attrition and Dr. H.P. Bimmlar's sub-orbital facial indices are used to determine the face-form like Leptoprosopic, Mesoprosopic and Euryprosopic. Degree of attrition of the subjects with mesoprosopy face-form is highest (1.167) and lowest in leptoprosopy (0.0482) and middle in Euryprosopy (0.897). The result is statistically significant and the relationship between the attrition level and face-form has been confirmed by Chi-square test.
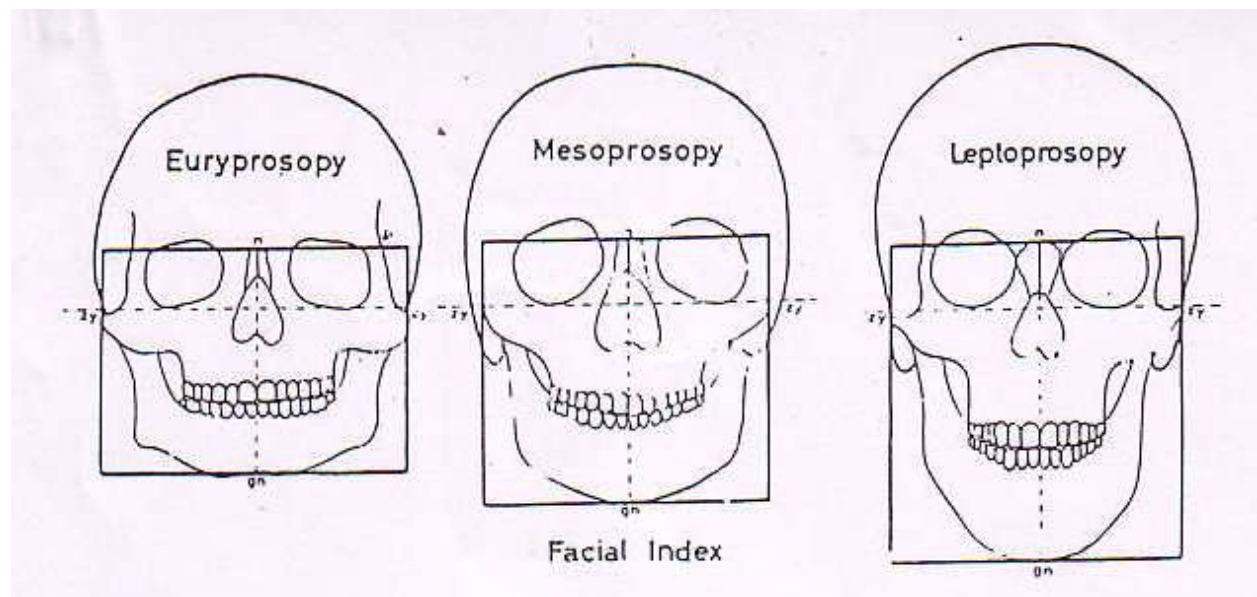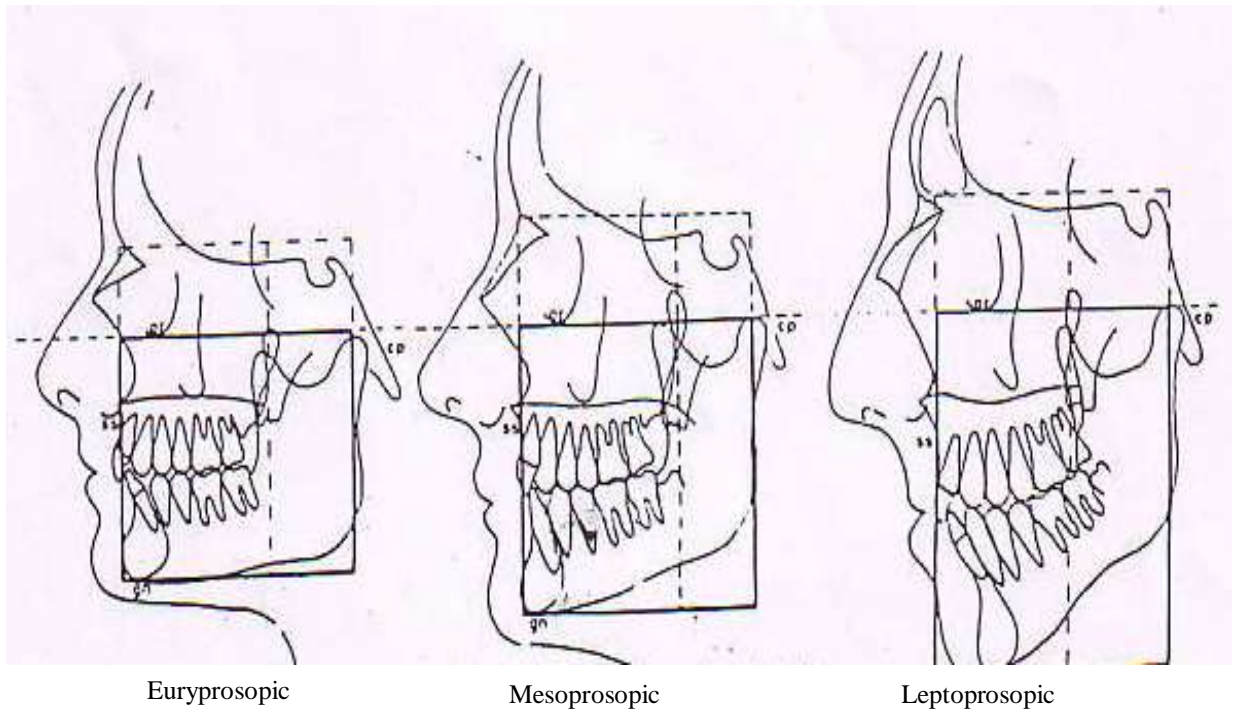

Fig. 1:- Showing frontal view of the skull in different face form.

Euryprosopic	Mesoprosopic	Leptoprosopic

Fig. 2:- Showing variation in direction of Bite with different face form
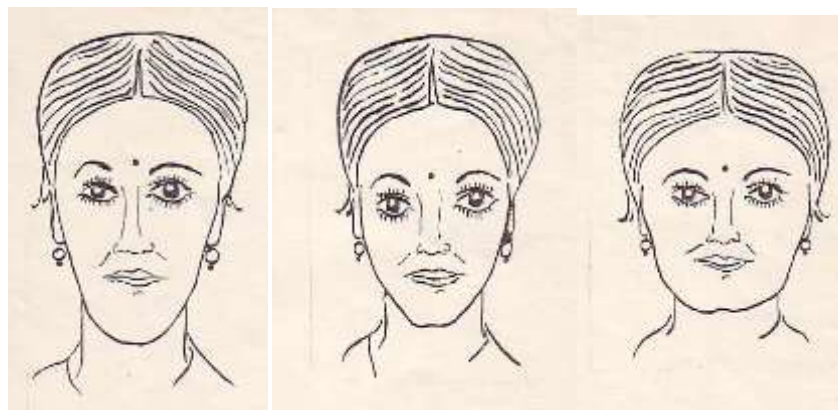

Fig. 3:- showing teeth with degree of attrition according to Brocca's classification is 0 and 1.

Fig. 4:- Showing teeth with degree of attrition as per Brocca's classification is – 2.

Fig. 5:- Showing teeth with degree of attrition 3 and 4 as per Brocca's classification .

Leptoprosopic	Mesoprosopic	Euryprosopic
H/L × 100 > 90	H/L × 100 = 85 to 89.9	H/L × 100 < 84.9

Fig. 6 :- Showing different types of face-form according to Dr. H.P. Bimlar's suborbital facial index.

Fig. 7:- Showing the measurement from nasion to gnathion which is denoted by "V"

Fig. 8:- Distance measured between the mid point of tragus of right and left side using Vernier caliper of range 0-30 cm with a long beaks. Denoted by "H"
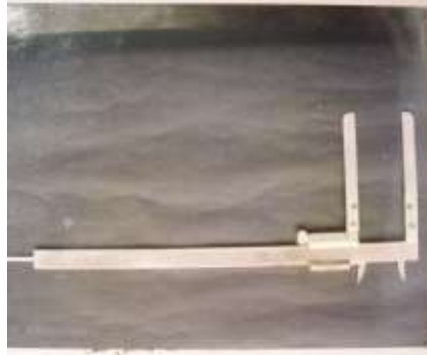
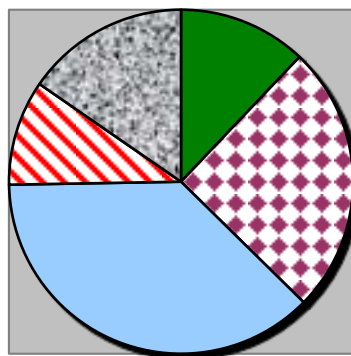**Fig. 9:-** Vernier caliper of range 0-30 cm with a long beaks.

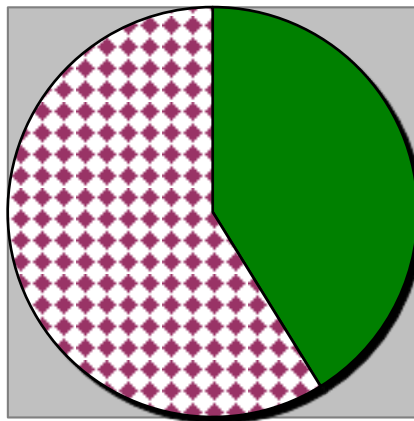**Fig.10:-** Frequency distribution of Mesoprosopic with mean degree of Attrition
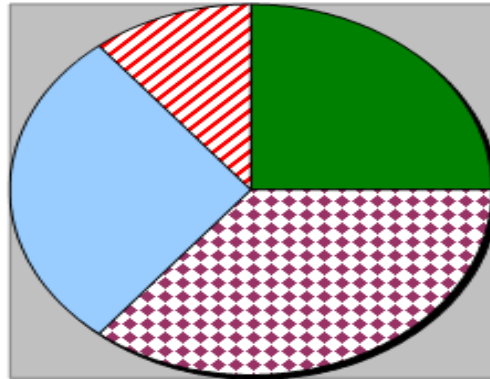

Fig. 11:- Frequency distribution of Leptoprosopic with mean degree of Attrition

Fig. 12:- Frequency distribution of Euryprosopic with mean degree of Attrition

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