

## Relationship between the Morphological Clinical Analysis and the VERT of Ricketts.

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### Summary

**Introduction:** With the advance of the diagnostic methods in Orthodontics, the determination of the facial pattern has been given more and more importance, it has been determined that the facial analysis is an indispensable resource for the adequate diagnosis and the success of the orthodontic treatment. The facial biotype analysis is the first data to be obtained from the Ricketts Summary Cephalogram, this in conjunction with the Morphological Facial Type Analysis alerts us to the use of procedures that would be deleterious for each facial pattern.

**Material and Method:** An observational, descriptive and cross-sectional investigation was carried out, of a total of 1077 schoolchildren examined, 90 children were selected, and 30 from each age group, (7, 9 and 11 years) with normal dental occlusion and no history of have received orthodontic treatment. Each of the 90 children underwent a facial clinical study to determine the morphological facial type, plus the facial bio typological analysis by the VERT method of Ricketts, where the Ricketts standards and the study norms made by Coned were used. Collaborators, to compare both results with the clinical facial morphological study of each child.

**Results:** In the analysis of Ricketts' VERT in the 90 children of the cross-sectional study where the Ricketts standards were used, a total of 32 children who presented a coincidence between the two facial analyzes (35.56%), for an Index of Kappa concordance 0.51 (moderate); and where the norms of the study were used, a total of 42 children who presented a coincidence between the two facial analyses (46.67%), for a Kappa Concordance Index 0.76 (good).

**Conclusion:** In general, better results were obtained in the relationship between Vert of Ricketts and the morphological facial typological analysis, when the study norms were used. It is necessary to perform both analyses to achieve a correct diagnosis of the facial characteristics of each patient.

**Keywords:** Facial pattern; Facial biotype; Ricketts' Summary Cephalogram; Morphological facial typological analysis; Ricketts' VERT; Normal dental occlusion

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### Introduction

Facial morphology is markedly modified as it passes from infancy to adolescence, which produces a change in proportions, due to a greater growth of the face, the prominence of the jaws and the considerable development of the chin and nose [1,2] Epidemiological studies have shown that many children in these periods of life present malocclusions in which we can find different morphological combinations [3,4]. It is considered that the deepening of the orthodontic diagnosis has enriched it and has helped to know how difficult it is. Problematic, where new motivations are shown in scientific work that may result in a more comprehensive knowledge of patients. [5-7],

With the advancement of diagnostic methods in orthodontics, the determination of the facial pattern has become increasingly important, it has been determined that facial analysis is an indispensable resource for the proper diagnosis and success of orthodontic treatment [8-10]. Facial analysis in the diagnostic process in Interceptive Orthodontics is of utmost importance, since the treatment plan cannot be elaborated solely from the cephalometric diagnosis but must be complemented with the evaluation of the soft tissues. [11]

Although the morphological differences between the human races, and between the individuals of the same race, can be considered as normal, it is convenient to know some of the general characteristics of the face before studying the alterations or anomalies of said morphology considered as normal. The width of the face can be measured using the morphological facial index, which is obtained by multiplying by 100 the distance ofrion-gnation (ofrion: point where the plane that follows the upper edge of the eyebrows and the mid sagittal plane is found; the lowest point of the contour of the chin) and dividing it later by the bizygomatic distance. [12,13]

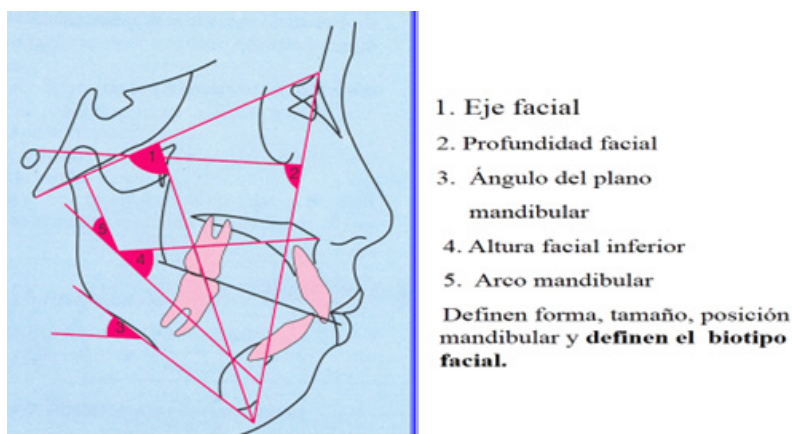
The facial biotype analysis is the first data to obtain from the Ricketts Summary Cephalogram. This identifies the patient, suggests a basic scheme of treatment, indicates mechanical behaviours to follow and alerts us to the use of procedures that would be deleterious to that facial pattern. In summary, it indicates an initial direction for treatment planning. [14-17]

For this reason it is considered important this research, which according to the literature review, is performed for the first time in Cuba with the aim of establishing the relationship between Ricketts VERT and Morphological Facial Type Analysis, according to Ricketts standards and those obtained by Conde., *et al.* [18].

### Material and Method

An observational, descriptive and cross-sectional research was carried out in the city of Cárdenas, province of Matanzas, of a total of 1077 schoolchildren examined, 90 children were selected, 30 from each age group, (7, 9 and 11 years old) with normal dental occlusion. And no history of having received orthodontic treatment.

With the 90 children, a study was conducted during the 2007-2008 academic year, each child underwent a lateral cranial radiograph and a facial clinical study to determine the morphological facial type of each. The tracings of the Summary Cryptogram of Ricketts were made for each teleradiography 16. To obtain the VERT, the first five measurements of the Summary Cephalogram are used (Annex 1)



**Annex 1:** Variables that Ricketts uses to perform the VERT.

**There are three facial patterns:**

- Mesofacial (growth provided)
- Dolicofacial (direction of vertical growth)
- Braquifacial (direction of horizontal growth)

Ricketts has developed a table for the biotypological identification of the patient according to the result of VERT.16 (Annex 2)

Severe Dico	Dolic	Soft dolicho	Via	Braqui	Severe brachi
-2	-1	-0,5	0	+0,5	+ 1

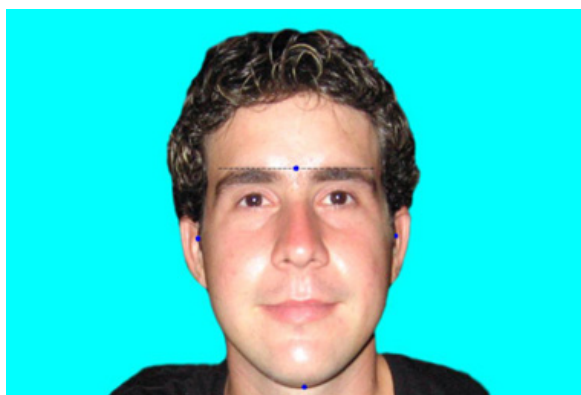
**Annex 2:** Table elaborated by Ricketts for the biotypological identification of the patient according to the VERT result.

Each of the 90 children in the study underwent facial bio typological analysis using the Ricketts VERT method, where the Ricketts standards and the study norms by Conde., *et al.* [18] were used to compare both results with the study. Clinical morphological facial of each child.

The determination of the different facial types was made using the morphological facial index, which is obtained by multiplying by 100 the distance ofrion-gnation (ofrion: point where the plane that follows the upper edge of the eyebrows and the mid sagittal plane; gnation: the lowest point of the contour of the chin) and dividing it later by the bizygomatic distance:

Facial index: distance ofrion-gnation x 100  
 Bizygomatic distance

According to the value of this index, we can distinguish the following facial types: above 104, leptoprosopo (with an elongated face), between 104 and 97, mesoprosopo (with an intermediate face) and, below 97, euriprosopo (with a broad face). The ofrion and gnation points are located in the mid sagittal plane, and the bzygomatic points in the horizontal plane on both sides of the face.12 (Annex 3)



*Annex 3: Figure where the points that define the height of the face (ofrion and gnation) are indicated, as well as the width in the zygomatic points (bizygomatic distance).*

### Results and Discussion

Table 1 shows the analysis of the morphological facial type that was performed on the 90 children of the cross-sectional study, in which the following results were obtained:

Mesoprosopos: 52 children (57,78%)

Euriprosopos: 17 children (18.89%)

Leptoprosopos: 21 children (23.33%)

Morphological facial type	Number of children	%
Intermediate	52	57,78
Euriprosopos	17	18,89
Leptoprosopos	21	23,33
Total	90	100

*Table 1: Results of the morphological facial type analysis in the 90 children of the cross-sectional study carried out in Cárdenas.*

Table 2 shows the analysis of Ricketts' VERT in the 90 children of the cross-sectional study carried out in Cárdenas. Where the Ricketts standards were used. 16

Facial Type	Number of children	VERT the Ricketts					
		Braqui sev.	Braqui	Via	Dolico count	Dolico	Dolico for yourself.
Intermediate	52	15	17	5	9	6	0
Euriprosopos	17	10	5	1	1	0	0
leptoprosopos	21	2	3	4	2	8	2
Totals	90	27	25	10	12	14	2

*Table 2: Analysis of Ricketts VERT in the 90 children of the cross-sectional study carried out in Cárdenas. Where the Ricketts standards were used.*

This shows the VERT of Ricketts performed in the 52 children with mesoprosopic facial type, nothing more than 5 children (9.61%) presented a mesofacial biotipología, which is a very low figure when taking into account that all children are mesoprosopos, 17 children were brachifacial (61.54%) and 15 children (28.85% dolicofacial.) Ricketts VERT was shown to 17 children with facial type euriprosopo, in which 15 children (88, 24%) presented brachifacial biotipology, this shows a very good relationship between the two analyses, 1 child was dolichofacial (5.88%) and also 1 child was mesofacial (5.88%). performed on 21 children with leptoprosopous facial type, where 12 children (57.14%) presented dolichofacial bio typology, 5 children (23.81%) were brachifacial, and 4 children (19.05% mesofacial). shows us also there was a coincidence of 5 mesofacial children with mesoprosopos , 15 of brachifacials with euriprosopos and 12 of dolicofacials with leptoprosopos, for a total of 32 children who presented a coincidence between the two facial analyses (35.56%), for a Kappa Concordance Index of 0.51 (moderate). (Annex 5)

Table 3 shows the analysis of Ricketts VERT in the 90 children of the cross-sectional study conducted in Cárdenas. Where the study rules were used.18

Facial Type	Number of children	VERT the Ricketts					
		Braqui sev.	Braqui	Via	Dolico count	Dolico	Dolico for yourself.
Intermediate	52	6	9	16	6	12	3
Euriprosopo	17	5	5	6	0	1	0
leptoprosopo	21	0	2	3	3	6	7
Totals	90	11	16	25	9	19	10

**Table 3:** Analysis of Ricketts' VERT in the 90 children of the cross-sectional study conducted in Cárdenas. Where the study rules were used.

It shows the VERT of Ricketts performed in the 52 children with mesoprosopic facial type, when the study standards were used, it rose to 16 (30.77%) children with mesofacial bio typology, which shows a better relationship between the two analyses when using this norm, 15 children (28.85%) presented brachifacial bio typology and 21 children (40.38% dolichofacial). The VERT of Ricketts was shown to the 17 children with euriprosopo facial type, in which 10 children (58.82%) presented brachifacial biotipology, 6 children (35.30% were mesofacial) and 1 child was dolichofacial (the 5.88%). In addition, the VERT of Ricketts performed on 21 children with leptoprosop facial type was observed, when the study standards were used, it was raised to 16 (76.19%) children with dolichofacial bio typology, which shows a very good relationship between the two analyses when using the norms of the study, brachifacial were 2 children (9.52%) and mesofacial 3 children (14.29%).

In this study it was verified that the VERT analysis shows a greater relationship of the facial type mesoprosopo with the mesofacial bio typology when the rules of this study were used (30.77%), because when using the rules of Ricketts it was only 9, 61% It was also verified that in the group of the euriprosopos when performing the VERT analysis, it showed a greater relationship with the brachifacial biotipology when the Ricketts standards were used (88.24%), because when using the rules of the study it descended at 58.82%. The table shows also there was a coincidence of 16 mesofacial children with mesoprosopos, 10 of brachifacials with euriprosopos and 16 of dolicofacials with leptoprosopos, for a total of 42 children who had coincidence between the two facial analyzes (46.67%), for a Kappa Concordance Index 0.76 (good). (Annex 6)

Table 4 shows the analysis of Ricketts' VERT in the 90 children of the cross-sectional study carried out in Cárdenas. The results obtained were obtained using the Ricketts standards16, with those obtained when the study standards were used.18

Facial type according to VERT	With the rules of Ricketts		With the rules of the study	
	Number of children	%	Number of children	%
Mesofacial	10	11,1	25	27,8
Brakifacial	52	57,8	27	30,0
Dolicofacial	28	31,1	38	42,2
Totals	90	100	90	100

**Table 4:** Analysis of Ricketts' VERT in the 90 children of the cross-sectional study conducted in Cárdenas. With the rules of Ricketts and with the rules of the study.

In this the VERT analysis is observed in the 90 children of the transversal study carried out in Cárdenas where the Ricketts standards were used. This shows that 10 children (11.1%) presented a mesofacial typology, 52 children (57.8%) were brachifacial and 28 children (31.1%) presented dolichofacial typology. In addition, the VERT analysis was observed in the 90 children of the cross-sectional study conducted in Cárdenas where the study's norms were used. This shows that 25 children (27.8%) presented a mesofacial typology, 27 children (30.0%) were brachifacial and 38 children (42.2%) presented dolichofacial typology. In this study it was found that although all the children had normal dental occlusion, when performing the analysis with the Ricketts standards, the majority of the children were brakifacial, 52 children (57.8%), while using the standards of the In the study, the number of mesofacials was increased to 25 children (27.8%) and of dolichofacials to 38 (42.2%), and in addition, children were more evenly divided among the three facial types. (Annex 7)

These results are better than those obtained by Curioaca and Portillo [19] in a study conducted in 89 Mexican children between 6 and 10 years of age of both sexes, who attended a Pediatric Dentistry Clinic during the period 2004-2005. They conducted a study determine the relationship between the clinical facial and radiographic somatotype (in which they used Ricketts' VERT) and in this it was found that only 19% of both diagnoses coincided. They also applied the Kappa concordance index with which they found that the repeatability of the two methods was low (Kappa = 0.192).

In a study conducted by Pérez Yanez [20] on the correlation between the Clinical and Cefalometric Facial Biotype in a total of 50 patients, this determined that 23 coincided in both diagnostic methods, which corresponds to 46%, reason why it concludes that there is a correlation moderate between both diagnoses. Taking into account the results obtained in this research and in the research reviewed, this author believes that it is extremely important not to rely on the physical characteristics or the subjective analysis of patients and perform the clinical and cephalometric analyses necessary to achieve a correct diagnosis of orthodontic patients.

## Conclusion

It is necessary to perform both analyzes to achieve a correct diagnosis of the facial characteristics of each patient. The VERT of Ricketts and the morphological facial typological analysis showed a better relationship when the norms of the study were used in the children mesoprosopos and leptoprosopos. The euriprosopic children showed a better relationship with the brachifacials when the Ricketts standards were used in the VERT analysis.

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