

# Medidas antropométricas orofaciais de crianças paulistanas e norte-americanas: estudo comparativo\*\*\*

## Anthropometric orofacial measurements of children from Sao Paulo and from North America: comparative study

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### Abstract

**Background:** anthropometric orofacial measurements of children from Sao Paulo and from North America. **Aim:** to describe the anthropometric orofacial measurements of children from Sao Paulo and to compare the obtained means to the North American norms. **Method:** participants were 254 children, leukoderm, in mixed dentition period, with ages ranging from 7 to 11 years and 11 months, with no history of speech, language and hearing disorders or treatment. The investigated anthropometric orofacial measurements were the height of the upper lip, the height of lower lip, the length of the philtrum and the height of lower face. In order to obtain these measurements, an electronic digital sliding caliper Starrett Series 727 was used. **Results:** the obtained data for the height of the upper lip, the height of the lower lip and the height of the lower face are below the means described for North American children. When considering the length of the philtrum, similar results were found between the research sample and North American children. **Conclusion:** the results of the measurements of the present sample referring to the height of the upper lip, the height of the lower lip and height of the lower face are below the values reported for North American children. The North American norms are not valid for the children of our population, except for the length of the philtrum.

**Key Words:** Face; Measurements; Anthropometry; Child; Stomatognathic System.

### Resumo

**Tema:** medidas antropométricas orofaciais de crianças paulistanas e norte-americanas. **Objetivo:** descrever medidas antropométricas orofaciais em crianças paulistanas e comparar as médias dessas medidas com os padrões de normalidade publicados para a população norte-americana. **Método:** participaram 254 crianças, leucodermas, em dentição mista, com idades entre 7 e 11 anos e 11 meses, sem histórico de distúrbios ou tratamento fonoaudiológicos. As medidas antropométricas orofaciais coletadas foram a altura do lábio superior, a altura do lábio inferior, o comprimento do filtro e a altura do terço inferior da face. O instrumento utilizado foi um paquímetro eletrônico digital Starrett Series 727. **Resultados:** os dados obtidos nesta amostra para a altura do lábio superior, altura do lábio inferior e altura do terço inferior da face encontram-se abaixo das médias descritas para as crianças norte-americanas. Os resultados desta amostra, referentes ao comprimento do filtro, coincidem com as médias descritas para as crianças norte-americanas. **Conclusão:** os resultados das medidas da presente amostra referentes a altura do lábio superior, altura do lábio inferior e altura do terço inferior da face foram menores do que aqueles publicados para as crianças norte-americanas. Os dados de normalidade da população norte-americana não são válidos para as crianças da nossa população, exceto para o comprimento do filtro.

**Palavras-Chave:** Face; Medidas; Antropometria; Criança; Sistema Estomatognático.

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## Introduction

Anthropometry is the biological science of measuring the size, weight and proportion of the human body (1) and provides objective data to the craniofacial morphology evaluation, through a series of head and face measurements (2). The anthropometry presents many advantages to the evaluation of craniofacial morphology by using simple, noninvasive, low-risk and inexpensive techniques. It is an important clinical tool due to its simplicity, besides providing reference normality data about a great variety of facial measurements of the Caucasian population (3-5).

Facial morphologic differences are described in studies of different populations because the craniofacial complex, specially the face, is one of the most varying parts of the human body (6-8). Therefore, it is important to use references based on race correspondent populations. With this perspective, Farkas and Deutsch (9) state that the validity of normal measurements necessarily depends of the comparison with appropriate population norms. It is extremely important that the clinic understands that the population norms of a given group are not necessarily valid to other samples or groups, specially when there are geographic and racial variations (10).

In respect to anthropometric orofacial measurements, the height of the upper lip (sn-sto) corresponds to the distance between the subnasale (sn) and the stomion (sto) (1,11). The height of the lower lip (sto-gn) is the distance between the stomion (sto) and the gnathion (gn) (11). The length of the philtrum (sn-ls) corresponds to the distance between the subnasale (sn) and the labiale superius (ls) (1). The height of the lower face (sn-gn) is the distance between the subnasale (sn) and the gnathion (gn) (12,13).

On a research with healthy Caucasian North American population, it was observed that height of the upper lip (sn-sto) is between 18,7 e 19,9 millimeters (mm) at 6 years old, with a small growth until 12 years old (measurements between 19,9 and 20,9mm). The authors also suggest that the height of the lower lip (sto-gn) measures between 40 and 41mm at 6 years old, increasing to 44mm at 12 years old. They also described that the length of the philtrum (sn-ls) measures between 12,6 and 14,44mm at 6 years old and 14,4mm with 12 years old (14).

The interest to the proposition of this research has grown as it was observed the lack of studies that determine if the international reference values of the anthropometric orofacial measurements can

be applied to our population. The purpose of this research was to describe anthropometric orofacial measurements in children from Sao Paulo and to compare the mean of these measurements with North American norms.

## Methods

Caregivers authorized the data collection by signing the informed consent form approved by the institution's committee for Ethics and Research from the Faculty of Medicine of University of Sao Paulo (protocol number 668/01). Subjects were 254 children with ages between 7 years and 11 years and 11 months, being 137 boys (54%) and 117 girls (46%), attending private schools of the city of Sao Paulo.

Children were divided in five groups according to their ages: 48 children between 7 years and 7 years and 11 months; 52 with ages varying between 8 years and 8 years and 11 months; 50 children between 9 years and 9 years and 11 months; 54 children between 10 years and 10 years and 11 months and 50 children between 11 years and 11 years and 11 months.

Inclusion criteria to this study were: leukoderm and mixed dentition period, with complete eruption of the first permanent molars. Exclusion criteria were: audiologic, speech or language complaints, prior or current speech pathology treatments and history of syndromes and/or neurologic diseases and/or bifid uvula.

The instrument used to obtain the anthropometric orofacial measurements was the electronic digital sliding caliper Starrett Series 727, made in Brazil, made of steel and with LCD display with unit system in milimetres and resolution and repeatability of 0,01mm.

During data collection it was asked that the children remained seated with both feet on the ground, with the head in resting position and closed lips. The anthropometric orofacial measurements obtained from each child were: height of the upper lip (from the subnasale to the stomion or sn-sto); height of the lower lip (from the stomion to the gnathion or sto-gn); length of the philtrum (from the subnasale to the labiale superius or sn-ls) and height of the lower face (from the subnasale to the gnathion or sn-gn). Subsequently, analysis were made in order to compare anthropometric orofacial measurements between children from Sao Paulo and from North American, according to North American norms, published by Farkas et al. (14).

**Statistical Analysis**

The comparison between the averages of anthropometric orofacial measurements separated boys and girls, according to the ages. To each anthropometric measure the confidence interval of 95% was determined. All analysis were processed with SPSS for Windows version 12.0 and the considered level of significance was 5%.

**Results**

1016 anthropometric orofacial measurements were obtained.

In respect to the height of the upper lip (sn-sto) and to the height of the lower lip (sto-gn), it is possible to observe that the means values obtained in the present study were always smaller than those obtained in researches by Farkas et al. (14). Those

have values that are above the confidence interval obtained in the present study on all age groups and for both subjects of both genders. It can be concluded, by this data, that the mean values of the upper lip (sn-sto) and the lower lip (sto-gn) identified by Farkas et al. (14) are statistically larger than those of the present sample. In respect to the length of the philtrum (sn-ls), the mean values described to North American children are within the confidence value obtained by the present research to boys of 7, 8 and 9 years old. The data obtained by the present study coincide with the results presented in researches by Farkas et al. (14) (Table 1).

On Table 2, it can be noted that in respect to the height of the lower face (sn-gn) all means determined by Farkas et al. (14) are above the confidence interval identified in the present study, on all age groups and on both genders. These results suggest that there are statistically significant differences between the means from the both populations.

TABELA 1. Comparação das medidas antropométricas orofaciais da região nasolabial.

Height of upper lip (sn-sto)				
Sex	Age (years)	Mean (mm)	IC 95% (mean)	Mean (mm)
		Children from Sao Paulo		Children from North America
Male	7	18,45	17,81 – 19,08	19,30
	8	18,51	17,83 – 19,19	19,70
	9	18,58	17,93 – 19,22	19,30
	10	18,53	17,87 – 19,18	20,30
	11	18,85	18,21 – 19,49	20,80
Female	7	17,54	16,74 – 18,34	18,80
	8	17,34	16,69 – 18,00	19,00
	9	17,57	16,84 – 18,29	19,20
	10	17,76	17,10 – 18,41	19,60
	11	17,63	16,90 – 18,36	19,40
Height of lower lip (sto-gn)				
Sex	Age (years)	Mean (mm)	IC 95% (mean)	Mean (mm)
		Children from Sao Paulo		Children from North America
Male	7	39,26	38,15 – 40,37	42,40
	8	39,14	37,95 – 40,34	42,20
	9	39,19	38,06 – 40,32	42,40
	10	41,04	39,89 – 42,19	43,30
	11	42,05	40,92 – 43,17	44,00
Female	7	37,38	35,98 – 38,79	40,70
	8	38,25	37,10 – 39,39	40,60
	9	39,20	37,93 – 40,47	40,90
	10	39,96	38,80 – 41,10	42,50
	11	41,05	39,78 – 42,32	42,20
Length of the philtrum (sn-ls)				
Sex	Age (years)	Mean (mm)	IC 95% (mean)	Mean (mm)
		Children from Sao Paulo		Children from North America
Male	7	13,32	12,70 – 13,94	13,70
	8	13,48	12,81 – 14,15	14,00
	9	13,20	12,57 – 13,83	13,30
	10	13,66	13,02 – 14,31	14,40
	11	13,74	13,11 – 14,38	14,50
Female	7	13,00	12,22 – 13,79	12,90
	8	12,70	12,06 – 13,34	13,20
	9	12,10	11,38 – 12,81	13,40
	10	12,96	12,31 – 13,60	12,70
	11	12,74	12,02 – 13,45	13,00

Legend: mm = millimeters; IC = confidence interval.

TABLE 2. Comparison of height of the lower face (sn-gn).

Sex	Age (years)	Mean (mm)	IC 95% (mean)	Mean (mm)
		Children from Sao Paulo		Children from North America
Male	7	58,48	57,16 – 59,80	61,10
	8	58,43	57,01 – 59,84	61,90
	9	58,68	57,34 – 60,03	61,70
	10	60,92	59,55 – 62,28	63,50
	11	61,69	60,35 – 63,03	65,30
Female	7	55,67	54,00 – 57,32	59,70
	8	56,76	55,40 – 58,13	59,30
	9	57,77	56,25 – 59,28	59,90
	10	58,93	57,57 – 60,30	62,20
	11	59,47	57,96 – 60,99	62,10

Legend: mm = milimeters; IC = confidence interval.

## Discussion

The researchers opted by the methodology described by classical anthropometric studies (1-3,5,15-19). In respect to the criteria for the children selection, it was considered the researches described by several authors (2,15-17,20-21). It was also selected only leukoderm children as in some studies (14,16-18), because some report facial measurements differences with multi-racial samples (7-9,22).

As it was possible to observe in this sample, the mean determined to height of the upper lip (sn-sto), to height of the lower lip (sto-gn) and to height of the lower face (sn-gn) were smaller on all age groups and on both gender, than those reported to North American population (14). The means obtained by this author are above the means and the confidence intervals of the present study, suggesting that the height of the upper lip (sn-sto) is larger in North American population.

The results obtained in this study referring to the length of the philtrum (sn-ls) coincide with the ones obtained by Farkas et al. (14), indicating that this structure has the same height in North American population and in this population.

This research has some limitations, because it compares two specific populations and also because the sample is relatively restricted; it should be an important step for future investigations.

The knowledge about orofacial measurements of children, and also its variations referring to the origin, verifying if there are statistically differences among different populations, brings precision in the results analysis. Moreover, it contributes to orofacial motricity evaluation and to establish the functional diagnosis done by the speech language pathologist, due to the possibility to quantify the structures of the face and to provide objective data about the orofacial morphology.

## Conclusions

The results obtained to children from Sao Paulo to the height of the upper lip, height of the lower lip and height of the lower face (sn-gn) are below the means reported to North American children. The results to length of the philtrum coincide in the both studied populations.

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