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SOMATOTYPE DIFFERENCES BETWEEN MAPUCHE AND NON-MAPUCHE CHILDREN OF 12 AND 13 YEARS OF MALLECO, ARAUCANÍA, CHILE

DIFERENCIAS DEL SOMATOTIPO ENTRE NIÑOS MAPUCHE Y NO MAPUCHE DE 12 Y 13 AÑOS DE MALLECO, ARAUCANÍA, CHILE

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ABSTRACT

Somatotypic studies and their description of the human morphological configuration allow to appreciate impacts on eating habits and sedentary lifestyle. This study determined the somatotypic difference in Mapuche (NM) and non-Mapuche (NNM) children from Malleco, Chile. Through the ISAK protocol, 160 children with a mean age of 12.5 years, height 145.5 ± 3.5 cm and weight 43.7 ± 3 kg were evaluated, obtaining the following classifications: Group 12 years, Mapuche; mesoendomorphs. Non-Mapuche group 12 years; Endomesomorph. Group 13 years old, Mapuche; Mesoendomorphs. Non Mapuche group 13 years old; endomesomorph. The results indicate that for the age of 12 years, the NM presented lower values of endomorphy and higher values of mesomorphy (p≤0.01) than NNM. The 13-year-old NMs presented lower endomorphy and mesomorphy values (p≤0.01) than NNM. In conclusion, Mapuche schoolchildren present a mesomorphic predominance, however, NNM present a predominance of the endomorphic component.

Key words: Somatotype; Mapuche ethnic group; Mesomorphy; Endomorphy (source: MeSH NLM).

RESUMEN

Los estudios somatotípicos y su descripción de la configuración morfológica humana permiten apreciar impactos en hábitos alimentarios y sedentarismo. Este estudio determinó la diferencia somatotípica en niños mapuche (NM) y no mapuche (NNM) de Malleco, Chile. Se evaluaron a través de protocolo ISAK, 160 niños con edad media de 12,5 años, talla 145,5 ± 3,5 cm y peso 43,7 ± 3 kg., obteniéndose las siguientes clasificaciones: Grupo 12 años, Mapuche, mesoendomorfo. Grupo no mapuche 12 años, endomesomorfo. Grupo 13 años, Mapuche, mesoendomorfos. Grupo no mapuche 13 años; endomesomorfo. Los resultados indican que para la edad de 12 años, los NM presentaron valores más bajos de endomorfía y valores más altos de mesomorfía (p≤0,01) que NNM. Los NM de 13 años presentaron valores más bajos de endomorfía y mesomorfía (p≤0,01) que NNM. En conclusión, los escolares mapuche presentan predominio mesomórfico, sin embargo, NNM presentan predominio del componente endomórfico.

Palabras clave: Somatotipo; Etnia mapuche; Mesomorfía; Endomorfía (fuente: DeCS BIREME).

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INTRODUCTION

The evaluation of the human body can be expressed in quantitative terms; the somatotype allows an evaluation of the human body's morphology and characteristics. There are methods available to determine the composition of the human body. Anthropometrically, the Heath-Carter Somatotype is the most widely used[1]. Research in the international context has identified somatotype differences between ethnic groups in Australia[2], New Zealand[3], and the United Kingdom[4]. In Chile, the interest in studying children belonging to original ethnic groups (Aymara, Pascuenses, Huilliches, Mapuche) has been somewhat excluded. Studies show that there are differences between races and gender[5]; An example of this is the work of Almagia et al.[6], which concluded that women marked an important predominance towards endomorphy with respect to men.

The somatotype provides information to characterize physical changes in the life cycle, allowing comparisons between the relative forms of genders. Specific values of the somatotype and its components have been correlated in different pathologies, heart disease, scoliosis, obesity, and osteoporosis[7]. According to Almagia et al.[6], to determine the population's growth and nutritional status, weight, and height variables are not enough, if they are not accompanied by anthropometric parameters such as somatotype. In this context, the results of the following cross-sectional comparative study of two groups based on this case, in Mapuche children contrasted with non-Mapuche children, are preliminarily presented.

THE STUDY

An observational, cross-sectional study in which two groups classified in relation to ethnicity are established, Mapuche versus non-Mapuche. The sample consisted of the entire school population belonging to the second basic cycle of public schools in Malleco. It was selected by simple probability sampling, randomly selecting 20 children. For the study of the somatotype, random sampling was carried out in the selection of the sample. The sample size was calculated using the StatCalc program from the Epi Info V.6.5 package, with a 95% confidence level. The sample size was 160 schoolchildren. Therefore, we worked with a total sample of 80 children of Mapuche descent and 80 non-Mapuche students from schools in the province of Malleco.

The somatotype calculation was performed using equations proposed by Carter[1]. Also, the distance between Mapuche vs. non-Mapuche somatotypes in the somatochart (distance between two somatotype points) was determined using the somatotype dispersion distance (DDS), calculated by the Hebbelinck method[8]. A DDS value greater than 2 indicates that there are significant differences between the two groups.

For the estimation of the somatotype, the Carter method[1] was applied, the data were recorded in an anthropometric chart, where referential data such name, age, ethnicity, weight and height were incorporated, and Rosscraft (metallic) anthropometric tape was used to evaluate the perimeter of the contracted arm and calf. The Rosscraft short branch anthropometer was used to measure the humeral and femoral diameters, the triceps, subscapular, supraspinal, and calf folds were measured with a Harpenden © plicameter. For body weight, a SECA scale was used, precision 0.1 kg, height was evaluated using the SECA model (Vogel & HalkeGmbH & CO. KG, Hamburg, Germany). The evaluation was carried out using techniques and standards described by ISAK[9]. Considering the rating scale and the somatotype characteristics described by Carter[1], the somatotype can be characterized by qualitative and quantitative values. These are presented in ranges: low from 0.5 to 2.5; Moderate 3 to 5; High from 5.5 to 7; Very high over 7.5.

The students were evaluated in their educational centers following strict ethical protocols and the presence of the parents. Out of respect for the traditions of the Mapuche ethnic group, we only worked with men.

The statistics were performed using Microsoft Excel © and SPSS software version 22.0 (SPSS Inc. Chicago), establishing the minimum significance level at 5%. The values are presented as frequencies in the categorical variable when analyzing somatotype. The Kolmorov Smirnov test studied the normality of the distribution of this variable. The chi-square test was used in relation to the analysis of the differences in the proportions of the somatotype.

The somatotype (distance between two somatopoints) was used, to establish the dispersion distance of the somatotype (DDS), that is, comparison of two somatotypes based on the coordinates (numerical values of X and Y)[10]. The equation originates by calculating the distance between two

points, being barely modified by characterizing the relationship between the x and y units, which is the cube root.

$$2\ DDS = \sqrt{3}(x1 - x2)2 + (y1 - y2)2$$

When:

DDS: dispersion distance of the somatotype

√ 3: Constant that transforms the units x into units

X_1 Y_1: Coordinates of the somatotype studied

X_2 Y_2: Coordinates of the reference somatotype = mean

The DDS allows verifying the distance between a somatotype study[8]. The standard or reference considered for the distance was arbitrarily established with a statistical significance p <0.05 (95% confidence interval) when DDS is equal to or greater than 2. Furthermore, the distance between somatotypes of Mapuche vs. non-Mapuche in the Somatochart (distance between two somatopoints) was determined using the Somatotype Dispersion Distance (DDS), calculated by the Hebbelinck method. The DDS gives a value greater than 2, indicating significant differences between the two groups.

The present study had the informed consent of families and schoolchildren and was developed following the Declaration of Helsinki's deontological criteria.

FINDINGS

12-year-old NMs had significantly lower values in the endomorphic component than NNM (3.8 ± 0.4 vs. 4.5 ± 0.6 P≤0.01). TTheapuche group's mesomorphic component showed a higher value than in the non-Mapuche group (4.2 ± 0.4 vs. 3.8 ± 0.5 P≤0.05). The Mapuche group's ectomorphic component showed a higher value than in the non-Mapuche group (2.5 ± 0.3 vs. 2.0 ± 0.6 P≤0.05), (Table 1). Therefore, the Mapuche group is classified as meso-endomorphic, and the non-Mapuche group is endo-mesomorphic. The somatotype dispersion distance (DSD) reaches a value of 2.31 (Figure 1), indicating significant differences between Mapuche and non-Mapuche somatotypes.

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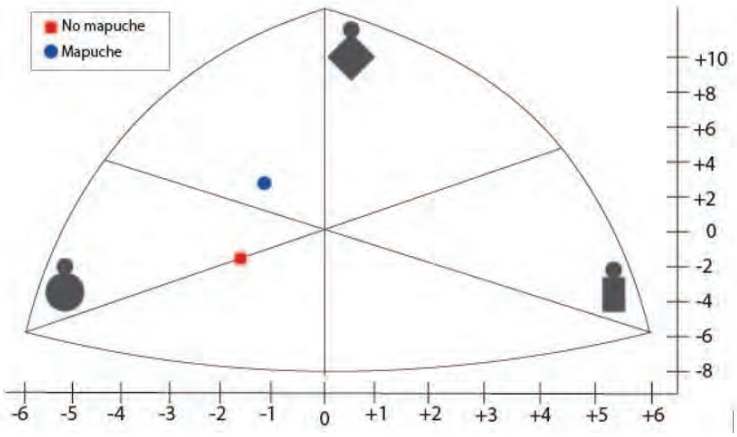
Table 1. Somatotype in 12-year-old Mapuche and non-Mapuche children.

	Endomorphy	Mesomorphy	Ectomorphy
Mapuche	3,8	4,2	2,5
Non-Mapuche	4,5**	3,8*	2,0*

*p≤0,05 **p≤0,01

Source: Own elaboration with investigation antecedents.



*DDS: 2,31

Source: Own elaboration with investigation antecedents.

Graphic 1. Somatochart in 12-year-old Mapuche and non-Mapuche children. Somatotypic comparison.

The 13-year-old NMs obtain significantly lower values in the endomorphic component compared to the non-Mapuche (3.7 ± 0.5 vs. 4.3 ± 0.6 P≤0.01). The Mapuche group revealed a higher value in the mesomorphic component than the non-Mapuche group (4.4 ± 0.6 vs. 3.9 ± 0.5 P≤0.01). The Mapuche group showed a higher value in the ectomorphic component than the non-Mapuche group (2.4 ± 0.5 vs. 1.9 ± 0.6 P≤0.05), (Table 2).

Table 2. Somatotype in 13-year-old Mapuche and non-Mapuche children.

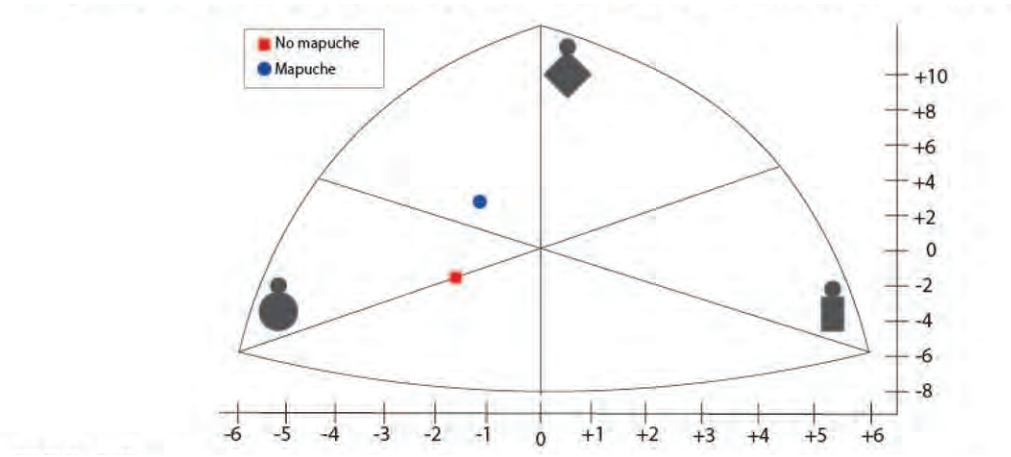
	Endomorphy	Mesomorphy	Ectomorphy
Mapuche	3.7	4.4	2.4
Non-Mapuche	4.3**	3.9**	1.9*

*p≤0,05; **p≤0,01

Source: Own elaboration with investigation antecedents.

Mapuches are classified as meso-endomorphs, and non-Mapuche as endo mesomorphs. The endomorphy, mesomorphy, and ectomorphy values were significantly different for both groups.

Regarding the somatotypes dispersion distance (DDS), it reaches a value of 2.2 (Figure 2), which indicates that there is a significant difference between the somatotypes of the two groups.



*DDS: 2,2

Source: Own elaboration with investigation antecedents.

Graphic 1. Somatocarta in 13-year-old Mapuche and non-Mapuche children.

DISCUSSION

The results have been contrasted with antecedents corresponding to other human groups previously studied with the same methodology. The somatotype analysis result indicates that the endomorphic factor (linked to the relative presence of adipose tissue), in terms of its classification, corresponds to moderate (3 to 5 according to qualitative classification). Mesomorphic factor (development of skeletal muscle) by classification corresponds to moderate (3 to 5 according to qualitative classification), the relation to the ectomorphic factor (relative slenderness), its classification corresponds to low. This classification is similar to the studies carried out by Silva et al.[11], about the non-Mapuche population, if the results of the Mapuche ethnic group are compared with the study carried out by Arcay et al.[12], for the Huilliche ethnic group, we find that their condition is similar, since both groups have the same somatotype classification (meso-endomorphs).

The results of this study are similar to the studies cited, since they allow comparisons with the sample of the Mapuche ethnic group, indicating that their behavior is equivalent[13]. This indicates that the somatotype trend shows similar orientations with previous studies carried out in Chile. It is noted that the Mapuche population presents a meso-endomorphic somatotype. When comparing groups, there are

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significant differences in endomorphism in favor of non-Mapuches, and in Mapuche, a mesomorphic condition is observed. The ectomorphy was found to be greater in the Mapuches. However, no significant differences were found when comparing somatotype components between ages. Research at the international level shows the opposite results to the findings of this work. When contrasting somatotypes between ethnic groups, Kagawa et al.[2], found differences when comparing Caucasian Australian children with Australian aborigines, children of Caucasian origin classified as meso-endomorphic and boys and girls with the aboriginal condition as endo-mesomorphic. Marrodán et al.[14] showed differences in somatotypes when comparing Mexican children and youth, it could be seen that schoolchildren from the Federal District and Lomas de la Estancia were classified as meso-endomorphs, while the inhabitants of Chontales were classified as meso-ectomorphs, a situation that differs from the results found in the present investigation. Differences between groups of different ethnic groups deserve special attention, due to the genetic load and the geographical context in which they have been developed and the scope of policies that intervene in the lifestyles of the ethnic groups.

The absence of evaluations of girls is considered a limitation in this study, a situation that is restricted out of respect for the Mapuche culture that considers these actions as inappropriate.

CONCLUSIÓN

Considering the observed differences, the somatotype classifies Mapuche children as "meso-endomorphic" for both age groups studied, non-Mapuche children obtained an endo-mesomorphic classification for both age groups. Ectomorphy did not appear in the classification of any of the groups studied.

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