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Does Postpartum Hypopituitarism Influence the Craniofacial Pattern? A Case-Control Study with Sheehan's Syndrome Patients

¿El Hipopituitarismo Posparto Influye en el Patrón Craneofacial? Un Estudio de Casos y Controles con Pacientes con Síndrome de Sheehan

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ABSTRACT: This study aimed to assess the craniofacial morphologic aspects of Sheehan's syndrome (SHS) patients.An observational study was performed with 19 women diagnosed with SHS and 19 controls matched by age and sex. Lateral cephalometric radiographs were obtained, and 30 linear and angular measurements were analyzed using the Radiocef Studio 2 software. The mean age of patients was 65.47 ± 10.19 years. The main findings were propositioned maxilla (52.63 %) and mandible (52.63 %) relative to the cranial base, mandibular prognathism in 73.68 %, deep growth pattern in 42.1 %, increased mandibular plane in 36.84 %, and reduction in anterior facial height. The SHS group showed statistically significant differences in SNB (p=0.026), N-Me (p=0.006), soft palate length (p=0.011), and Ena-Me (p<0.001) in comparison with controls. The standard deviation score analysis revealed altered values in relation to total maxillary and mandibular lengths. SHS showed altered craniofacial morphology, characterized by maxillo-mandibular prognathism, brachyfacial type, increased mandibular plane, and reduction in soft palate length. This study reports novel findings in SHS.

KEY WORDS: hypopituitarism, cephalometrics, dentofacial anomalies, Sheehan's syndrome.

INTRODUCTION

In the 1930s, Dr. Harold Leeming Sheehan first observed a rare condition characterized by a necrotic process involving the pituitary gland of women during the postnatal period. He observed massive necrosis in the adenohypophysis of a woman who suffered severe blood loss during or after delivery. At present, Sheehan's syndrome (SHS) remains a persistent and noteworthy public health concern that is usually related to low-income countries characterized by poor obstetric assistance and health care (Sheehan, 1937; Karaca *et al*., 2016; Gokalp *et al*., 2009).

SHS is intrinsically related to the gestational period. The pituitary gland almost doubles in volume during this phase, mainly due to prolactin-secreting cell-associated hyperplasia observed in its anterior region. As a result, the adenohypophysis is more susceptible to ischemic damage since it presents a deficient arterial microvascularization and a predominance of a venous pattern. When the adenohypophysis-related blood flow of arterial vessels is interrupted, it provokes an ischemic event, which may predispose to partial or total necrosis of the adenohypophysis (Karaca *et al*., 2016).

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Studies assessing the oro-facial aspects of individuals with SHS are scarce. We have performed the first study evaluating the dental status and salivary parameters in a group of patients with SHS (de Sá Cavalcante *et al*., 2019), and observed significant findings that support the relationship between hormone imbalance and oral health repercussions in SHS, highlighting the need for further studies in this endocrinopathy. Therefore, the present investigation aimed to analyze the craniofacial morphology of Brazilian individuals affected by SHS and add novel data from this rare condition.

MATERIAL AND METHOD

This study was approved by the Ethics Committee (protocol number 983 022, Ethics Committee of the Federal University of Ceará), and our convenience sample included 38 volunteers (19 SHS and 19 controls). The controls were sex- and age-matched healthy volunteers who did not present bone metabolism-related alterations after a proper examination (Fig. 1).

The included variables were age, clinical aspects related to SHS, and cephalometric parameters. The cephalometric variables (Fig. 2). For assessing the studied variables, all images were acquired using the same device (Kodak Dental Systems, Carestream Health, Rochester, NY, EUA). Subsequently, cephalometric software (Radiocef Studio 2 licensed by Radiomemory, Belo Horizonte-MG, Brazil) was used to provide the necessary analyses.

To evaluate the craniofacial morphology of the enrolled patients, McNamara's cephalometric analysis was performed. Furthermore, aiming to address additional data, a personalized analysis called "Sheehan" was obtained using the Mixcef tool of the Radiocef Studio 2 software. In total, 30 parameters were assessed.

In addition, the comparison of cephalometric data between SHS subjects and controls was based on the standard deviation score (SDS), which is a helpful method to verify the homogeneity or heterogeneity for a certain variable (a value lower than -2 or over 2 is considered abnormal). It may be calculated according to the intensity of the difference of each measure about the mean of its group adjusted to its standard deviation. Firstly, it was performed as a subtraction between the studied cephalometric measurement value (represented by the letter "X") and the mean of its group (represented by the term "Mean"). Subsequently, the value obtained after subtraction was divided by the standard deviation (SD) value of the respective group to obtain the SDS (Oliveira-Neto *et al*., 2011).

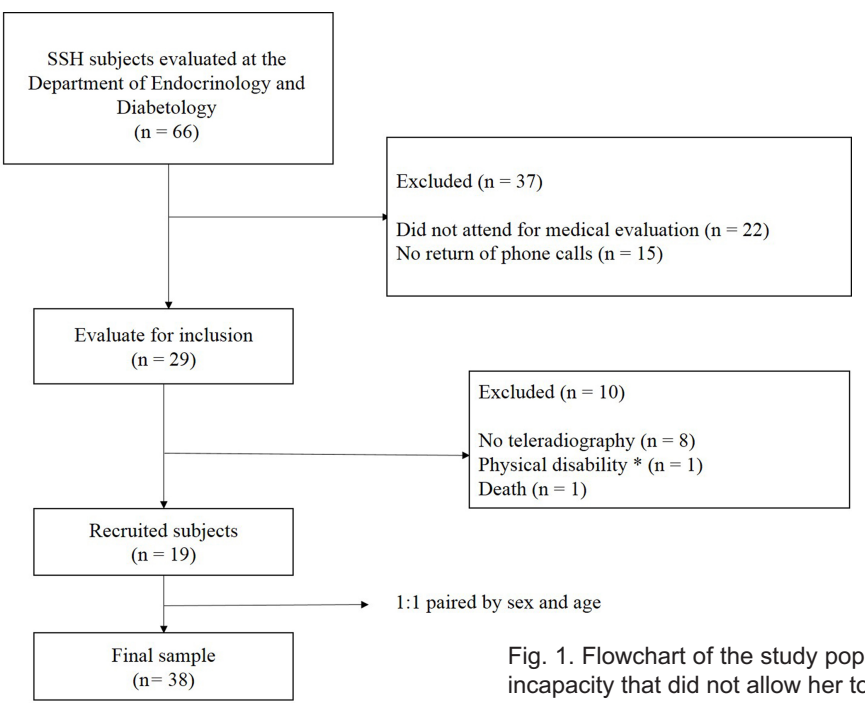

Fig. 1. Flowchart of the study population evaluated. * Patient had physical incapacity that did not allow her to participate in the study.

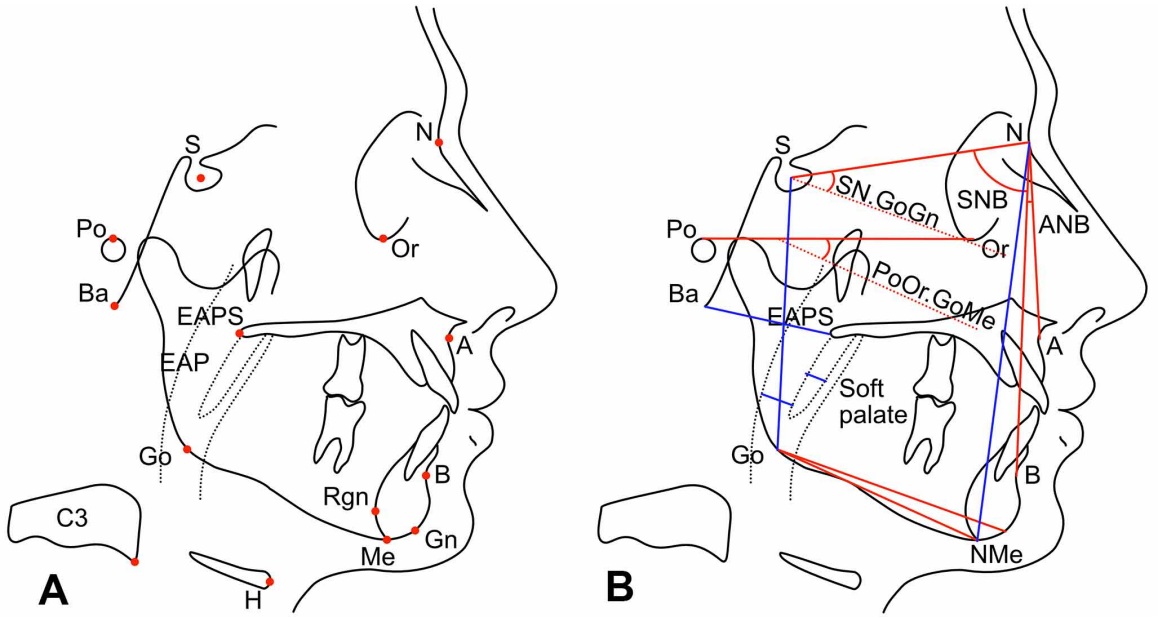

Fig. 2. Cephalometric approach of this study. A) craniometric points. B) Angular (red lines) and linear (blue lines) measurements.

Before all analyses, 38 randomly selected lateral cephalometric radiographs were evaluated at 30-day intervals to calculate casual and systematic errors. Dahlberg's equation was used to estimate the error method of the performed measurements.

The Shapiro–Wilk test verified the Gaussian distribution data, and the study results were described as the mean and standard deviation (SD) of the mean. As the normality was confirmed, the following tests were used: Student's t-test (measured by measurement evaluation) and ANOVA-2-way adjusted by Bonferroni post hoc test (multivariate analysis of all cephalometric measurements). Categorical data were reported as frequencies (absolute and relative types), and were evaluated using the Chi-square (3x2 tables) statistics or Fisher's exact test (2x2 tables). Pearson's correlation coefficient was used to assess the influence of delay in SHS diagnosis and cephalometric variables. Significant results were considered when the values of p were lower than 0.05. The statistical approach in this research used IBM SPSS Statistics for Windows, version 20.0 (IBM Corp., Armonk, N.Y., USA).

RESULTS

At the time of the study, patients had a chronological age ranging from 49 to 86 years (mean of 65.47 ± 10.19 years). At the time of SHS diagnosis, the patient's age varied between 31 and 61 years (mean, 40.4 ± 7.78 years). The age of the patients during their last delivery, when there were characteristic obstetric events related to SHS, ranged from 23 to 40 years (mean, 29.87 ± 5.52 years). The delay in the diagnosis of this condition ranged from 1 to 31 years (mean, 10.79 ± 9.07 years), which was the number of years that each patient received a medical diagnosis of SHS after their last delivery. All patients were undergoing replacement for thyroid and adrenal axis deficiencies without replacement of growth hormone (GH).

Diagnostic tracings in the SHS group. Regarding the relationship between the maxilla and the cranial base, 8 patients showed a normal position, 2 had maxillary retrognathism, and 8 had maxillary prognathism. The mandible was found in the normal position in 8 patients. The SNB characteristics of mandible retroposition were observed in 2 patients, and those related to mandible prognathism were found in 9 patients.

A normal maxilla-mandible relationship in the anteroposterior position was observed in 3 patients with SHS. ANB values consistent with retrognathism of the mandible were found in 13 patients, and those representing a mandibular prognathism were found in 3 cases. When the vertical cephalometric components were analyzed, the mesofacial type was found in 3

patients, the dolichofacial type in 8 patients, and the brachyfacial type in 8 SHS patients.

The relationship between the mandibular plane and skull base (SN.GoGn) and Frankfurt plane (PoOr.GoMe) was normal in 36.84 % (SN.GoGn = 31.50 ± 4.60, GoMe = 22.70 ± 4.30), reduced in 26.31 % (SN.GoGn < 31.50 ± 4.60, PoOr.GoMe < 22.70 ± 4.30), and increased in 36.84 % (SN.GoGn > 31.50 ± 4.60, PoOr.GoMe > 22.70 ± 4.30). The anterior facial height (N-Me) was reduced in 89.47 % of the sample (N-Me < 114 mm) and increased in 10.52 % of the individuals (N-Me > 114 mm). When SHS and non-SHS subjects were compared, a statistically significant decrease (p = 0.006) in anterior facial height was observed among SHS patients.

Comparison of skeletal characteristics between the SHS and control group. The SHS group demonstrated a statistically significant value of SNB angle in comparison with controls (p = 0.026), whereas N-Me (p = 0.006) and soft palate length (p = 0.011) were lower than those in the control group. There was a statistically significant difference (p < 0.05) between the groups regarding the SDS value of SNB, ANB, SN.GoGn, PoOr.GoMe, S-Go, N-Me, superior posterior airway space (SPAS), posterior airway space (PAS), and soft palate length. Regarding McNamara's analysis, EnaMe was statistically lower in SHS than in controls (p < 0.001). SDS evaluation of this cephalometric assessment showed a statistically significant difference (p < 0.05) between SHS and non-SHS groups concerning PmSnLs, Pog-N perpendicular, Nfa-Nfs, Bfa-Bfb, Ena-Me, and PoOr.GoMe. The skeletal comparison between the studied groups is shown in Tables I and II and illustrated in Figure 3. In addition, Table III revealed no statistically significant correlation between SHS diagnosis delay and cephalometric parameters.

Table I. Mean value of cephalometric measurements and standard deviation score (SDS) according to the "Sheehan analysis".

	Groups		
	Control	SHS	p-Value
Cephalometric measurements			
SNA°	82.62±1.05	83.85±1.04	0.410
SNB°	79.12±1.05	82.57±1.04	*0.026
ANB°	3.50±0.70	1.27±0.89	0.057
Ba.SN°	132.76±1.18	132.36±1.03	0.802
SN.GoGn°	35.06±1.53	31.27±1.90	0.128
PoOr.GoMe°	27.39±1.44	24.82±1.77	0.267
S-Go (mm)	69.72±1.06	66.83±1.25	0.086
N-Me (mm)	110.85±1.17	104.55±1.83	*0.006
S-Go / N-Me (ratio)	0.63±0.01	0.64±0.01	0.518
SPAS (mm)	11.38±0.69	12.43±0.55	0.242
PAS (mm)	11.03±0.77	13.03±1.09	0.145
Ba-ANS (mm)	42.89±0.81	43.25±0.82	0.761
Soft palate length (mm)	32.46±0.98	28.80±0.95	*0.011
Soft palate width (mm)	8.04±0.23	8.01±0.39	0.948
MP-H (mm)	15.24±1.17	16.25±1.01	0.515
C3-H (mm)	72.00±0.77	70.48±1.42	0.354
RGn-H (mm)	36.72±0.95	39.33±2.04	0.254
SDS			
SNA°	0.273±0.233	0.269±0.226	0.104
SNB°	0.758±0.231	0.752±0.227	*<0.001
ANB°	0.574±0.181	0.726±0.290	*0.001
Ba.SN°	0.088±0.263	0.077±0.200	0.620
SN.GoGn°	0.459±0.185	0.570±0.285	*0.005
PoOr.GoMe°	0.334±0.187	0.410±0.281	*0.034
S-Go (mm)	0.531±0.194	14.529±0.27	*<0.001
N-Me (mm)	0.787±0.146	1.236±0.360	*<0.001
S-Go / N-Me (ratio)	0.190±0.180	0.243±0.293	0.217
SPAS (mm)	0.436±0.286	0.350±0.184	*0.028
PAS (mm)	0.418±0.162	0.593±0.325	*0.010
Ba-ANS (mm)	0.099±0.228	0.100±0.231	0.543
Soft palate length (mm)	0.884±0.236	0.858±0.223	*<0.001
Soft palate width (mm)	0.018±0.137	0.029±0.384	0.909
MP-H (mm)	0.231±0.266	0.199±0.198	0.203
C3-H (mm)	0.245±0.125	0.451±0.423	0.129
RGn-H (mm)	0.293±0.106	0.632±0.495	0.083

*p<0.05; Student's t-test (mean ± standard error of the mean); SHS, Sheehan's syndrome; MP, mandibular plane.

Table II. Mean value of cephalometric measures and standard deviation score (SDS) according to McNamara's analysis.

	Group		
	Control	SHS	p-Value
Cephalometry			
A-Nperp (mm)	2.03±0.73	3.01±0.94	0.863
PmSn Ls°	91.78±3.18	94.48±4.96	0.147
Co-Gn (mm)	106.75±1.36	127.51±20.3	0.340
Co-A (mm)	80.61±1.04	104.17±22.0	0.308
Mx/Md diff (mm)	26.14±1.03	23.34±2.05	0.350
ANS-Me (mm)	65.37±1.14	59.07±2.37	*<0.001
PoOr.GoMe°	27.39±1.44	24.65±1.87	0.280
BaN.PtmGn°	-1.23±1.15	-1.21±6.28	0.478
Pog-Nperp (mm)	-0.77±1.51	2.90±2.03	0.053
L1-APog (mm)	3.98±0.64	3.29±1.23	0.588
Nfa-Nfp (mm)	11.38±0.69	12.42±0.85	0.281
Bfa-Bfp (mm)	11.03±0.77	13.80±1.76	0.150
SDS			
A-Nperp (mm)	0.055±0.220	0.058±0.240	0.731
PmSn Ls°	0.418±0.164	0.584±0.321	*0.010
Co-Gn (mm)	0.223±0.029	1.769±1.816	0.287
Co-A (mm)	0.238±0.020	2.680±2.583	0.273
Mx/Md diff (mm)	0.269±0.167	0.369±0.315	0.084
ANS-Me (mm)	1.094±0.149	1.685±0.353	*<0.001
PoOr.GoMe°	0.324±0.186	0.399±0.282	*0.039
BaN.PtmGn°	0.173±0.076	0.524±0.693	0.330
Pog-Nperp (mm)	0.649±0.230	0.647±0.229	*<0.001
L1-APog (mm)	0.176±0.164	0.246±0.441	0.388
Nfa-Nfp (mm)	0.392±0.275	0.327±0.191	*0.040
Bfa-Bfp (mm)	0.412±0.161	0.587±0.327	*0.011

*p<0.05; Student's t-test (mean ± standard error of the mean); SHS, Sheehan's syndrome; Nperp, the line N perpendicular to Frankfurt's plane; Mx/Md diff, difference between mandibular and maxillary length.

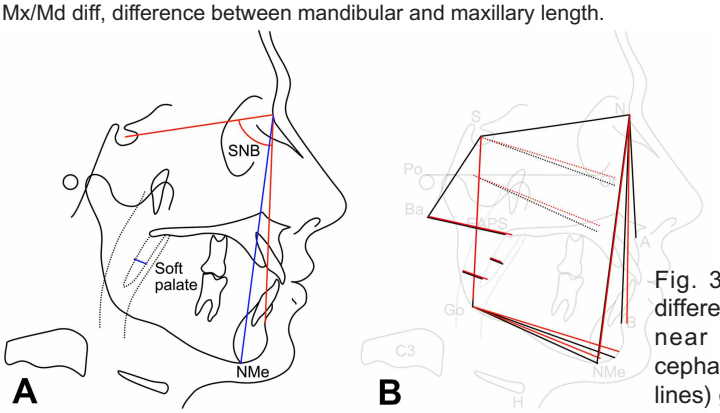

Fig. 3. Variables that showed a statistically significant difference between the groups. A) angular (red lines) and linear (blue lines) parameters. B) overlapping of the cephalometric tracings of control (black lines) and case (red lines) groups.

DISCUSSION

In this study, statistically significant data were observed regarding some SHS-related cephalometric linear and angular measurements compared to controls. Significant differences in lateral cephalometric radiographs regarding craniofacial aspects were found in patients with other syndromes and hormonal deficiencies related to the adenohypophysis (Oliveira-Neto *et al*., 2011; de Sá Cavalcante *et al*., 2019).

Methodologically, it was purposeful to evaluate angular variables related to the craniometric point S, since they are obtained from the sella turcica. This anatomic structure contains the pituitary gland (Edler, 1979), which plays a key role in the pathophysiology of SHS, which was confirmed by previous studies that described morphological changes following pituitary gland necrosis, such as partial or empty sella (Sheehan, 1937; de Faria *et al*., 2009; Dostalova *et al*., 2010). When analyzing the position of the mandible in relation to the cranial base through SNB angle (Dostalova *et al*., 2010), mandibular (SNB>80º), and maxillary (SNA>82º) prognathisms were found in more than 50 % of SHS individuals, resulting in a bimaxillary protrusion. SDS analysis also suggested a significant discrepancy between the jawbones and a mandibular prognathism considering the typical values of ANB. Also, the anti-clockwise rotation of the mandibular plane (SN.GoGn<32º) was present in 42.1 % of patients with SHS, which may be justified by missing teeth, as previously described by our research group (Cavalcante *et al*., 2018).

The soft palate length was reduced in individuals with SHS since an expected value of 12 mm is considered as the distance from the posterior aspect of the soft palate to the posterior wall of the pharynx (Kovacs, 2003), which is important for evaluating the posterior airway. The soft palate did not present with its typical thinning characteristic in patients with

Table III. Influence of SHS diagnosis delay on the cephalometric variables.

	SHS diagnosis delay (years)			
	Up to 10 (n = 10)	>10 (n = 9)	p-Value*	Correlation†
Cephalometric measurements				
SNA°	82.44±6.35	85.72±3.27	0.287	p=0.595 (r=0.171)
SNB°	82.74±4.05	84.68±6.00	0.526	p=0.803 (r=0.081)
ANB°	-0.30±2.67	1.05±3.71	0.488	p=0.641 (r=0.150)
Ba.SN°	133.70±3.91	132.75±5.08	0.726	p=0.422 (r=-0.256)
SN.GoGn°	31.99±8.78	32.01±2.68	0.997	p=0.976 (r=0.010)
PoOr.GoMe°	25.04±7.72	26.23±3.64	0.740	p=0.772 (r=0.094)
S-Go (mm)	64.88±6.11	68.77±7.29	0.340	p=0.672 (r=0.137)
N-Me (mm)	103.30±5.47	106.64±8.36	0.432	p=0.803 (r=0.081)
S-Go / N-Me (ratio)	0.63±0.07	0.64±0.02	0.657	p=0.767 (r=0.096)
SPAS (mm)	13.29±2.62	12.22±2.09	0.449	p=0.570 (r=-0.182)
PAS (mm)	13.69±3.19	12.87±6.39	0.782	p=0.307 (r=0.322)
Ba-ANS (mm)	43.69±3.70	44.67±4.16	0.674	p=0.723 (r=-0.114)
Soft palate length (mm)	26.77±4.28	30.54±5.01	0.191	p=0.542 (r=0.196)
Soft palate width (mm)	7.84±1.65	7.85±1.82	0.994	p=0.352 (r=-0.295)
MP-H (mm)	18.93±3.54	15.51±4.51	0.174	p=0.168 (r=-0.425)
C3-H (mm)	67.43±4.74	68.96±3.39	0.536	p=0.422 (r=0.256)
RGn-H (mm)	43.99±13.08	37.98±4.67	0.314	p=0.513 (r=-0.210)
SDS				
SNA°	-0.04±1.39	0.68±0.71	0.287	p=0.595 (r=0.171)
SNB°	0.79±0.88	1.21±1.31	0.526	p=0.803 (r=0.081)
ANB°	-1.24±0.87	-0.80±1.21	0.488	p=0.641 (r=0.150)
Ba.SN°	0.18±0.76	0.00±0.99	0.726	p=0.422 (r=-0.256)
SN.GoGn°	-0.46±1.32	-0.46±0.40	0.997	p=0.976 (r=0.010)
PoOr.GoMe°	-0.37±1.23	-0.18±0.58	0.740	p=0.772 (r=0.094)
S-Go (mm)	14.10±1.33	14.95±1.58	0.340	p=0.672 (r=0.137)
N-Me (mm)	-1.48±1.07	-0.83±1.64	0.433	p=0.803 (r=0.081)
S-Go / N-Me (ratio)	0.00±1.39	0.28±0.49	0.657	p=0.767 (r=0.096)
SPAS (mm)	0.64±0.87	0.28±0.70	0.449	p=0.571 (r=-0.182)
PAS (mm)	0.79±0.95	0.54±1.90	0.782	p=0.307 (r=0.322)
Ba-ANS (mm)	0.22±1.05	0.50±1.18	0.674	p=0.723 (r=-0.114)
Soft palate length (mm)	-1.34±1.00	-0.45±1.18	0.191	p=0.542 (r=0.196)
Soft palate width (mm)	-0.19±1.62	-0.19±1.79	0.994	p=0.352 (r=-0.295)
MP-H (mm)	0.73±0.70	0.05±0.89	0.174	p=0.168 (r=-0.425)
C3-H (mm)	-1.36±1.41	-0.91±1.01	0.536	p=0.422 (r=0.256)
RGn-H (mm)	1.76±3.17	0.30±1.13	0.314	p=0.513 (r=-0.210)

*p<0.05, Student's t-test (mean ± SD); †p<0.05, Pearson's correlation; SDS, standard deviation score; MP, mandibular plane.

SHS. Despite the observed shortening of the soft palate, none of the patients showed clinical signs of impaired speech. The severity of the soft palate length alteration was probably not sufficient to produce a speech disorder. In addition, a reduction in the posterior airway was found in the SHS group.

Regarding facial length, a higher frequency of reduced anterior facial height was found in the SHS group, which characterizes a mesocephalic or brachycephalic face pattern, while this aspect did not occur in relation to the posterior facial height (S-Go). Although the mandibular plane angle was increased in more than 30 % of patients with SHS, this finding could be explained by the increase in the Co-Gn measure, which contributes to an increase in the mandibular plane angle (Sanyal & Raychaudhuri, 2012). In addition to the fact that the increase in the value of the gonial angle may be directly related to the masticatory muscle performance, other aspects related to SHS patients should also be analyzed, including mass muscle reduction and GH deficiency. Such aspects may contribute to a progressive loss of facial musculature rigidity, difficulty in chewing, and nutritional deficit (Edler, 1979; Banzal *et al*., 1999; Gei-Guardia *et al*., 2011).

A potential contributing factor to skeletal changes was the impossibility of replacing GH in the evaluated patients. Hormonal replacement, when performed early in younger individuals, seems to reduce facial convexity due to the growth of the mandibular condyle. Another benefit would be an increase in the lower facial length (ANS-Me). Oliveira-Neto *et al*. (2011) in a study of patients affected by isolated GH deficiency, showed significant changes in the length of the posterior cranial base, total mandibular length, total posterior and anterior facial height, mandibular body length, and anterior skull base. Based on these studies, the age and duration of hormonal deficiency seem to influence craniofacial development, with the most severe repercussions in young patients (Oliveira-Neto *et al*., 2011).

Metabolic disorders are commonly found in SHS, sharing some similarities with other endocrine diseases that were previously assessed by cephalometric analysis (Ricketts, 1981; Banzal *et al*., 1999; Oliveira-Neto *et al*., 2011). Since SHS has been associated with an altered skeletal bone pattern and reduced muscle mass (Edler, 1979; Kovacs, 2003), craniofacial abnormalities could be expected when cephalometric variables are evaluated in these individuals. Despite lacking sufficient evidence in the literature regarding the role of panhypopituitarism (which was seen in this research, such as hypothyroidism, GH deficiency, and reduced secretion of cortisol and FSH/LH) influencing cephalometric aspects in SHS, we believe these changes could affect the patient's hormonal homeostasis and osteomuscular system. However, the absence of similar studies with SHS patients was the main limitation of this investigation, restricting the discussion of the results with the available literature.

Adenohypophysis hormone production-related imbalance alters bone and muscle metabolism, making the maxillo-mandibular complex vulnerable to skeletal alterations. In this context, the patients included in the present study were women who had hypopituitarism for a long time but did not receive GH replacement therapy as previously mentioned (Cavalcante *et al*., 2018), which made them susceptible to significant skeletal changes due to altered levels of this hormone. Such findings may have contributed to a linear reduction of the anterior facial length and alterations in the craniofacial morphology of the evaluated individuals with SHS.

Regarding study limitations, the sample size was the main aspect in this research, which was probably related to the rare occurrence of SHS. However, the evaluated sample of Brazilian SHS individuals was higher than that reported by Famuyiwa *et al*., 1992, (n=11 Nigerian participants). Another limitation was the number of controls since it was impossible to reach a 1:4 case-control ratio when the study was performed.

CONCLUSIONS

The main characteristics were bimaxillary prognathism, reduced soft palate length, increased mandibular plane angle, and brachyfacial pattern. The present study highlights the importance of assessing craniofacial morphology in disorders such as SHS. Although a brachyfacial type was a common finding in SHS, these patients did not require surgical correction. Future studies evaluating the maxillo-mandibular complex-related bone architecture pattern may add important information to understanding SHS, which remains prevalent in underdeveloped countries.

ETHICAL APPROVAL. The present study was approved by the Ethics Committee of the Federal University of Ceará, Ceará, Brazil (protocol number 983 022).

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RESUMEN: Este estudio tuvo como objetivo evaluar los aspectos morfológicos craneofaciales de los pacientes con síndrome de Sheehan (SHS). Se realizó un estudio observacional con 19 mujeres diagnosticadas con SHS y 19 controles asociados por edad y sexo. Se obtuvieron radiografías cefalométricas laterales y se analizaron 30 medidas lineales y angulares mediante el software Radiocef Studio 2. La edad media de los pacientes fue de 65,47 ± 10,19 años. Los principales hallazgos fueron proposición maxilar (52,63 %) y mandíbula (52,63 %) con respecto a la base del cráneo, prognatismo mandibular en 73,68 %, patrón de crecimiento profundo en 42,1 %, aumento del plano mandibular en 36,84 % y reducción de la altura facial anterior. El grupo SHS mostró diferencias estadísticamente significativas en SNB (p=0,026), N-Me (p=0,006), longitud del paladar blando (p=0,011) y Ena-Me (p<0,001) en comparación con los controles. El análisis de la puntuación de la desviación estándar reveló valores alterados en relación con las longitudes maxilares y mandibulares totales. El SHS mostró una morfología craneofacial alterada, caracterizada por prognatismo maxilomandibular, tipo braquifacial, aumento del plano mandibular y reducción de la longitud del velo del paladar. Este estudio informa hallazgos novedosos en SHS.

PALABRAS CLAVE: hipopituitarismo, cefalometría, anomalías dentofaciales, síndrome de Sheehan.

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