

Anthropometric characterization of patients having acromegaly

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The Acromegaly is a hormonal disorder characterized with increased levels of growth hormone (somatotropin) In acromegalic person the pituitary produces to much somatotropin with is usually due to an adenoma. As the condition progresses we can observe changes in facial bone structure. The mandibula is growing and a pragmatism is presented and an enlargement of nose and lips is observed.

The studied contingent includes 96 acromegalic patient and a representative extract from Bulgarian population of 5261 persons. We used standard anthropometric methods by R.Martin and K.Saller (1957) and we used 16 cephalometric signs to define the antropometric status of both groups. The comparing analysis of cephalometric characterization of patients with acromegaly and healthy persons shows that acromegalic patients of both sexes in comparison with healthy contemporary Bulgarian population are characterized by: bigger head in all dimensions, wider and longer face, significantly bigger nose, wider and higher lips, bigger hands and wider and longer feet, witch can help to distinguish acromegalic patients

Key words: acromegaly; cephalometry; anthropology

Introduction

The Acromegaly is a hormonal disorder characterized with increased levels of growth hormone (somatotropin). [8]The somatotropin is produced by the pituitary gland located in the brain. In acromegalic person the pituitary produces to much somatotropin with is usually due to an adenoma. [1,6]

The name Acromegaly came from Greece (acro- extremity and megalos –large) it is because of abnormal enlargement of head, feet and hands. [7,4]The enlargement of hands and feet is an early symptom which patients notice as change of shoe and ring size.[2,6]

As the condition progresses we can observe changes in facial bone structure.[5] The mandibula is growing and a pragmatism is presented and enlargement of nose and lips is observed. [,3]

Material and Methods

Material

The studied contingent includes 96 acromegalic patient (with confirmed diagnose in the Endocrine clinic at Sofia medical university) and a representative extract from Bulgarian population of 5261 persons studied by specialists from the institute of experimental morphology and anthropology with museum at BAS-Sofia during national program for anthropological characterization of Bulgarian population.

The patients participating in the study are examined in the period 2009-2011.

Males-38(39,6%) and females 58(60,4%) the average age is $50,55 \pm 12,14$ and is in the range 22-77years. The controlling group is formed by 2416(45,9%) men and 2845(54,1%) women with common average age of 35 years.

Methods

We used standard anthropometric method by R.Martin and K.Saller (1957) and we used 16 cephalometric signs

Results

Comparing analysis of cephalometric characterization of patients with acromegaly and healthy persons.

To avoid the obscure effect of the age factor related to normally presented senile changes during the process of aging we have excluded from the analysis the patients who were more than 48 year old. So we achieved a statistically equal groups regarding age.

Besides, the two groups were compared separately by sex because of the presence of sexual dimorphism in most of the studied anthropological signs.

Males

On (table 1) is visible that:

There is a significant difference in the average values of almost every studied signs in males except: nasal high; length of right arm and length of right hand.

The average values of the anthropological signs in patients are higher than in control group regarding the signs: Horizontal lap of the head; length of the head; Width of the head. This shows that the acromegalic patients are characterized by bigger head in all aspects which proves the suggested enlargement of the bones of the skull as the growth of the covering tissue, caused by the high level of somatotropin. The higher values of the signs width of the cheekbones; width of lower jaw are evidence of wider faces in patients as a consequence of enlargement of cheekbones and the body and branch of the mandibula caused by the disease.

Higher values in height of the forehead, Physiognomic face height and morphological face height are evidence of longer face in patients compare to healthy persons. The signs characterizing the nose as width, height and depth of the nose are significantly higher than those in control group and show a bigger nose in all dimensions in acromegalic patients.

With bigger average values are also the signs width of lips and height of the lips showing bigger mouths in patients with acromegaly.

The data shows higher body height which is probably result growth of some of the long bones. We observed higher values in signs: – length and width of the foot which are evidence of foot growth

Table 1: Comparison of investigated signs in patient and healthy controls -males

Sign	Patients, 22 men		Controls , 2416 men	p
	\bar{X}	SD	\bar{X}	
Horizontal lap of the head	60,69	2,79	57,40	<0,001
Biggest length of the head	20,70	1,05	19,04	<0,001
Biggest width of the head	16,22	0,89	15,62	0,005
Smallest width of the forehead.	10,48	0,85	11,40	<0,001
Width of cheekbones.	15,52	0,95	14,28	<0,001
Width of lower jaw.	11,97	0,66	10,88	<0,001
Height of forehead	7,11	0,71	6,10	<0,001
Physiognomic face height.	19,88	0,99	18,76	<0,001
Morphologic face height *	13,30	0,86	12,66	0,002
Length of the nose	5,68	0,44	5,43	0,013
Height of the nose	5,64	0,40	5,56	n.s.
Depth of the nose	2,41	0,39	1,62	<0,001
Width of the nose	4,41	0,37	3,55	<0,001
Width of lips	5,79	0,44	5,47	0,003
Height of lips	2,16	0,54	1,71	0,001
Body height	176,09	8,48	171,47	0,019
Length of arm	31,74	2,14	30,94	n.s.
Length of forearm	26,16	1,74	24,78	0,001
Length of hand	20,22	1,59	20,66	n.s.
Length of foot	27,92	1,61	26,32	<0,001
Width of foot	11,95	0,68	10,18	<0,001
Transverse diameter of chests	34,88	3,32	31,08	<0,001
Sagittal diameter of chests	26,25	3,49	24,74	0,056
Width of wrist	6,59	0,54	6,00	<0,001
Width of hand without thumb	10,17	0,62	8,89	<0,001
Weight	99,00	24,72	77,70	0,001
BMI	31,79	6,78	26,40	0,001

* – distribution different than normal

Table 2: Comparison of investigated indexes in patients and healthy controls -males

Sign	Patients, 22 men		Controls , 2416 men	p
	\bar{X}	SD	\bar{X}	
Head index	78,47	4,80	82,10	0,002
Transverse forehead-crown index	64,67	5,01	72,18	<0,001
Morphologic face index	85,80	5,44	88,70	0,021
Sagittal nose index	42,53	3,26	38,46	<0,001
Cheekbones-jaw index	77,24	4,26	79,80	0,010
Transverse head-face index	95,74	4,10	91,72	<0,001
Nasal index	78,59	8,32	64,30	<0,001
Width-depth nasal index	54,92	9,44	45,60	<0,001
Lips index	37,40	8,88	31,20	0,004
Foot index	42,88	2,97	38,70	0,028
Chests index	75,16	6,27	72,00	0,001

The statistically significant differences in signs: Width of the hand, with and without the thumb confirm the enlargement of the hand which is characteristic for the disease

The gain of weight and fats is very characteristic for the disease and it is confirmed by the values of :Weight and BMI.

With lower value in acromegalic is presented only the sign –width of forehead.

In the comparison of values of cephalometric indexes we got the following results (table 2): There are significant differences in all calculated index values.

The average values of indexes of patients are higher than those in healthy controls in, all nasal indexes, lips index, foot index, head-face index and chest index.

With lower values are morphologic face index, cheekbones-jaw index and head index.

Females

Table 3 is showing:

Tere is a significant difference in values of investigated signs in females except height of lips, length of hand and length of arm.

The average values of signs in patients are higher than controls for:

Horizontal lap of the head, biggest width of the head, biggest length of the head, width of cheekbones, width of lower jaw, height of forehead, physiognomic face height, morphologic face height, length of nose, depth of nose, width of nose, width of lips, Body height, width and length of foot, Transverse diameter of chests, width of wrist joint, width of hand without thumb, weight and BMI.

With lower leverage value in patients with acromegaly are only the signs: Smallest width of the forehead and sagittal diameter of the thorax.

The comparison of the anthropometric indexes shows the fowling results: (table 4).

Table 3: Comparison of investigated signs in patient and healthy controls -females

Sign	Patients, 15 women		Controls, 2845 women	p
	\bar{X}	SD	\bar{X}	
Horizontal lap of the head	58,21	1,24	54,50	<0,001
Biggest length of the head	19,41	0,65	18,00	<0,001
Biggest width of the head	15,65	0,63	14,88	<0,001
Smallest width of the forehead.	10,41	0,40	10,93	<0,001
Width of cheekbones.	14,80	0,45	13,45	<0,001
Width of lower jaw.	11,46	0,49	10,08	<0,001
Height of forehead	6,83	0,61	5,81	<0,001
Physiognomic face height.	19,09	0,78	17,43	<0,001
Morphologic face height *	12,57	0,79	11,62	<0,001
Length of the nose	5,79	0,41	5,06	<0,001
Height of the nose	5,69	0,41	5,20	<0,001
Depth of the nose	2,39	0,25	1,57	<0,001
Width of the nose	3,94	0,57	3,22	<0,001
Width of lips	5,65	0,42	5,12	<0,001
Height of ips	1,92	0,46	1,74	n.s.
Body height	166,14	5,07	158,58	<0,001
Length of arm	29,07	1,35	28,64	n.s.
Length of forearm	23,46	0,93	21,94	<0,001
Length of hand	18,92	0,73	18,81	n.s.
Length of foot	25,65	1,18	23,92	<0,001
Width of foot	11,23	0,93	9,34	<0,001
Transverse diameter of chests	31,49	3,52	27,30	<0,001
Sagittal diameter of chests	22,80	3,31	26,40	0,001
Width of wrist	6,08	0,48	5,30	<0,001
Width of hand without thumb	9,01	0,35	7,89	<0,001
Weight	83,57	16,67	65,30	0,001
BMI	30,41	6,65	26,00	0,022

* - distribution different than normal

Table 4: Comparison of investigated indexes in patients and healthy controls -females

Sign	Patients, 15 women		Controls, 2845 women	p
	\bar{X}	SD	\bar{X}	
Head index	80,73	5,15	82,70	n.s.
Transverse forehead-crown index	66,61	3,71	71,53	<0,001
Morphologic face index	85,04	6,05	86,50	n.s.
Sagittal nose index	45,26	2,22	42,10	<0,001
Cheekbones-jaw index	77,47	3,41	81,30	0,001
Transverse head-face index	94,68	3,50	86,92	<0,001
Nasal index	69,81	11,95	62,50	0,033
Width-depth nasal index	62,15	12,15	48,70	0,001
Lips index	33,84	6,69	33,90	n.s.
Foot index	43,81	3,53	39,10	<0,001
Chests index	72,50	7,85	72,00	n.s.

There is a significant difference in values of most of the indexes except – head index, morphological face index, lips index and chest index;

The leverage values of patients are higher than average of healthy people in: sagittal nose index, transverse head-face index, nose index, width-depth index of the nose and foot index;

With lower leverage value in patients with acromegaly are the signs: transverse forehead-crown index and cheekbones-jaw index.

Conclusion

The comparative analysis is showing significant differences in almost every signs characterizing the face and head parts attended by the disease, in this cases the average values are higher in patients with acromegaly.

This results lead to conclusion that acromegalic patients of both sexes in comparison with healthy contemporary Bulgarian population are characterized by: bigger head in all dimensions, wider and longer face, significantly bigger nose, wider and higher lips, bigger hands and wider and longer feet, as the leaded study gives a quantitative characteristic of the morphological changes in patients with acromegaly which gives the opportunity to eventually distinguish the presence of the disease.

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