Arquivos Brasileiros de Endocrinologia & Metabologia

REFERÊNCIA

DANTAS, Renata Aparecida Elias et al. Physical activities in daily life and functional capacity compared to disease activity control in acromegalic patients: impact in self-reported quality of life. **Arquivos Brasileiros de Endocrinologia & Metabologia**, São Paulo, v. 57, n. 7, p. 550-557, out. 2013. DOI: https://doi.org/10.1590/S0004-27302013000700009. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-27302013000700009&lng=pt&tlng=pt. Acesso em: 09 set. 2020.

Physical activities in daily life and functional capacity compared to disease activity control in acromegalic patients: impact in self-reported quality of life

Avaliação da atividade física na prática de vida diária comparada com o nível de atividade da doença em pacientes acromegálicos: impacto na percepção da qualidade de vida

Renata Aparecida Elias Dantas[1,2], Karine Elias Passos[1], Lara Benigno Porto[1], Juliano Coelho Oliveira Zakir[1], Marcia Cristina Reis[1], Luciana Ansaneli Naves[1]

[1] Unit of Endocrinology, School of Medicine, Universidade de Brasília (UnB), DF, Brazil
[2] School of Physical Education, Centro Universitário de Brasília (UniCEUB), Brasília, DF, Brazil

ABSTRACT

Objective: To evaluate the quality of life and its association with daily physical activity and disease control in acromegalic patients. **Subjects and methods:** A cross-sectional, case series study, composed of 42 patients recruited from the Neuroendocrinology Unit of the University Hospital of Brasilia. Level of physical activity was accessed by the International Physical Activity Questionnaire (IPAQ 6-short-form), which evaluates the weekly time spent on physical activity of moderate to vigorous intensity in different contexts of life. Quality of life was evaluated by The Medical Outcome Study Questionnaire Short Form (SF-36). Data was compared to growth hormone (GH) and insulin-like growth factor (IGF-1) levels. Students' *t* test and Fisher test were used, $p < 0.05$, SPSS 17.0. **Results:** Twenty--two women, aged 51.33 ± 14.33 and 20 men, aged 46.2 ± 13.18 were evaluated. Arthralgia was present in 83% of cases. In men, the most common sites of pain were the knees (73%), spine (47% lumbar, and 53% thoracic and cervical segments), hands and wrists (40%). Higher scores on SF-36 were observed in patients with intermediate or high levels of physical activity, in the domains social functioning (75 CI 57.3-92.6), general health (75.5 CI 60.4-90.5), mental health (70 CI 57.8-82.1). **Conclusions:** In this study, the presence and severity of physical disability and pain were not associated with initial GH and IGF-1 levels or time of exposure to GH excess. However, the patients considered controlled, with normal a normal age-adjusted IGF-1, presented higher scores in SF-36, in physical and emotional domains, compared with patients with persistent hypersomatotrophism. These findings suggest benefits of metabolic control in self-reported quality of life. Arq Bras Endocrinol Metab. 2013;57(7):550-7

Keywords
Acromegaly; quality of life; functional capacity; activities in daily life

RESUMO

Objetivo: Avaliar a qualidade de vida e sua associação com a prática de vida diária e controle metabólico em pacientes portadores de acromegalia. **Sujeitos e métodos:** Estudo seccional de série de casos, composto por 42 pacientes recrutados na Unidade de Neuroendocrinologia do Hospital Universitário de Brasília. O nível de atividade física foi estimado pelo Questionário Internacional de Atividade Física (IPAQ-6), que avalia o tempo gasto semanalmente em atividades físicas que variam de intensidade em diferentes contextos de vida. A qualidade de vida foi avaliada pelo questionário SF-36. Os dados obtidos foram comparados aos níveis de hormônio do crescimento (GH) e fator de crescimento semelhante à insulina (IGF-1). Os testes *t* Students e Fisher foram aplicados e $p < 0,05$ foram considerados significativos, SPSS 17.0. **Resultados:** Avaliaram-se 22 mulheres com idades de 51,33 ± 14,33 e 20 homens com idades de 46,2 ±13,18. Artralgia foi relatada em 83% dos pacientes. Em homens, os sítios de dor mais comuns foram os joelhos (73%), coluna vertebral (47% lombar, 53% segmentos torácico e cervical), mãos e quadris (40%). Os maiores escores no SF-36 foram observados em pacientes com níveis intermediário ou alto de atividade física, sobretudo nos domínios social (75 CI 57,3-92,6), saúde geral (75,5 CI 60,4-90,5), saúde mental (70 CI 57,8-82,1). **Conclusões:** A presença e a severidade do prejuízo no desempenho físico e dor não se associaram com Gh e IGF-1 no diagnóstico, tempo de exposição prévio à doença. Todavia, pacientes considerados controlados apresentaram melhores escores nos domínios físico e emocional, comparados com pacientes com hipersomatotrofismo persistente. Tais achados sugerem benefícios do controle metabólico na qualidade de vida. Arq Bras Endocrinol Metab. 2013;57(7):550-7

Descritores
Acromegalia; qualidade de vida; capacidade funcional; atividades da vida diária

Correspondence to:
Luciana Ansaneli Naves
SQS 111, bloco B, ap. 23
70374-020 – Brasilia, DF, Brazil
dralucianananaves@gmail.com

Received on Nov/2/2012
Accepted on Mar/25/2013

INTRODUCTION

Acromegaly is a rare chronic disease, due to growth hormone (GH) and insulin-like growth factor (IGF-1) oversecretion (1). The estimated prevalence is 40-70 patients for one million inhabitants, and the age of diagnosis occurs in most cases in the third to fifth decade of life. The disease is associated with reduced expectancy of life and high mortality related to cardiovascular and metabolic co-morbidities. (2,3).

The disease results in most cases from a somatotropic pituitary tumor (4), but is rarely associated to neuroendocrine ectopic tumors and uncommon genetic familial syndromes (5,6). The behavior is insidious and the delay in diagnosis may be more than 10 years after the tumor development (7).

The most prevalent clinical manifestations are soft tissue enlargement, organomegaly, and metabolic complications. The cardiovascular disease is related to more than 60% of mortality in acromegalic patients (8). Hypertension occurs in more than 46% of patients with acromegaly and a higher frequency of classic and non-classic cardiovascular risk factors was described (9,10).

The articular manifestations are frequent and may be present as the earliest symptom of acromegaly (11). Arthropathy can affect both axial and peripheral joints; the most involved are hips, shoulders, knees, hands, and elbows. It is frequently irreversible despite treatment, and may contribute to decreased quality of life (Qol) (12). Musculoskeletal impairment is related to articular damage and its prevalence and severity worsens with the duration of uncontrolled disease, resulting in significant physical disability (13).

Some studies compared the quality of life in patients with several types of pituitary tumors, treated for long periods of time, using questionnaires to evaluate Qol, anxiety and depression. The authors concluded that patients treated for acromegaly reported more impairment in physical ability and more pain compared to patients treated for nonfunctioning macroadenomas and prolactinomas (14). The questionnaire SF-36 has been described as an important tool to evaluate the self-reported quality of life, and may be useful in patients with acromegaly (15-17).

The impairment in quality of life in acromegalic patients may be related to depression, poor self-image, pain, mood swings, impaired physical activity and mental health (15,18). This study evaluated postural defects, physical disability in daily life activities, and the consequences in quality of life in a cohort of Brazilian acromegalic patients.

AIM OF THIS STUDY

The aims of this study were to describe the impairment in physical ability for daily life activities and functioning, and compare it with the quality of life and its relation with the type of treatment and activity of the disease in acromegalic patients.

SUBJECTS AND METHODS

This is a cross-sectional, case series study that enrolled 42 patients with confirmed diagnosis of acromegaly (19,20), recruited from outpatient clinics of the Neuroendocrine Unit of the University Hospital of Brasilia. Before beginning the study, a structured anamnesis, medical record review, physical evaluation of each participant were put together to document symptoms, co-morbidities, current medications, and previous treatments. All patients were submitted to GH and IGF-1 determinations, using standardized chemiluminescence methods (Immulite 2000-IS 98/574). The patients were categorized by gender, tumor size and invasiveness, previous treatments (surgery, radiotherapy, medical treatment), and activity of disease (controlled and not controlled). All patients answered specific questionnaires to evaluate the level of physical activity and quality of life. All procedures used in this study were in accordance with the resolution 196/96 from the Brazilian Ministry of Health, and were approved by the ethics committee from our institution. All patients signed an informed consent form before the inclusion in the study.

Evaluation of level of physical activity and quality of life

The level of physical activity was evaluated by the International Physical Activity Questionnaire (IPAQ 6-short-form), which measures the weekly time spent on physical activity, from mild to vigorous intensity, in different contexts of life, such as work, housekeeping, transportation, and leisure (21).

The Qol was evaluated by The Medical Outcome Study Questionnaire Short Form (SF-36), which is a dimensionless questionnaire to measure generic quali-

ty of life, translated and validated for Brazil (18). This questionnaire is composed of 36 items, grouped in eight health domains: functional capacity, physical aspects, pain, general health, vitality, social functioning, emotional aspects and mental health, and self-reported health status (18,22).

Clinical anamnesis and evaluation of pain

Clinical anamnesis was performed and an interview in the form of a questionnaire was used to assess the patients' perception of the presence and intensity of headaches and osteoarticular pain. In this instrument, a map demonstrating a human figure to show sites of discomfort by a Visual Analogue Scale for pain was presented to each patient (23). All patients were photographed in front of a white background, at a distance of 3 meters, in anterior, posterior, right, and left position as proposed by Kendall (24). All patients were using bathing suits, and were in orthostatic position with the body relaxed. The data was inserted in the software Physical Test 6.3-Terrazul.

Statistical analysis

Student's *t* test was performed for the comparative analysis of quantitative variables. Fisher exact test was used to compare frequencies and determine associations between categorical variables. The distributions of all continuous variables were reviewed for normality using the Kolmogorov-Smirnov test. Relationships between continuous variables were accessed by Spearman Rank or Pearson correlations. All statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS 17.0) and p values < 0.05 were considered statistically significant.

RESULTS

Characteristics of the sample

The group was composed of 22 women and 20 men aged 53.63 ± 14.3 and 46.35 ± 13.18 years old, respectively. The delay between the first symptoms and diagnosis for the whole cohort was 5.43 years, but no statistically significant differences were found between genders (p = 0.92). The women presented a tendency to have higher mean age at diagnosis than men at the inclusion in the study, but no statistical difference was found (Table 1).

Tumor size

By the time of diagnosis, 89.4% of women had macroadenomas (17.05 mm; CI 95% 12.77-21.33), 36.8% with supra and parasellar invasion to cavernous sinus and carotids (Table 2). In men, 13.04% had microadenomas and the frequency of invasive macroadenomas was 43.47% (21.35 mm; CI 95% 16.52-26.18) (p = 0.18 calculated by test t for difference between genders).

Table 2. Distribution of frequency of tumor size and invasion at the diagnosis, categorized by gender

	Intrasellar microadenoma (%)	Intrasellar macroadenoma (%)	Invasive macroadenoma (%)
Women	10.53	52.6	36.8
Men	13.04	56.5	43.47
p -value	0.09	0.93	0.18

p values calculated by the Fisher exact test, statistically significant when < 0.05. Results are expressed in percentage.

Table 1. Description of baseline characteristics of study subjects, categorized by gender

	Age at diagnosis	Age at the inclusion	Delay symptoms and diagnosis	Time of exposure to GH excess
Women	44.95 (37.68-52.22)	53.63 (47.15-60.11)	5.37 (3.59-7.15)	12.95 (9.86-16.04)
Men	37.83 (32.59-43.07)	46.35 (41.20-51.50)	5.48 (3.74-7.22)	14.39 (11.34-17.44)
Total	41.05 (36.74-45.36)	49.64 (45,59-53,69)	5.43 (4.23-6.62)	13.74 (11.64-15.83)
p-value	0.09	0.07	0.93	0.49

p values calculated by the Student's *t* test, statistically significant when < 0.05. Results are expressed in means of years, and confidence intervals (CI 95%).
N = 42 patients.

Frequency of symptoms reported at the diagnosis

The frequency of symptoms was categorized by gender (Table 3). Enlargement of soft tissue was the most prevalent complaint in both genders. Arthralgia was present in 84.21% of women and 82.61% of men. Sudoresis and cephalea were very frequent, with no statistically significant differences between genders.

Table 3. Distribution of frequency of symptoms at the diagnosis, categorized by gender

Symptoms	Women (%)	Men (%)	*p-value**
Enlargement of soft tissue	19 (100)	22 (95.65)	1.00
Sudoresis	17 (89.47)	22 (95.65)	0.85
Arthralgia	16 (84.21)	19 (82.61)	1.00
Cephalea	15 (78.95)	16 (69.57)	0.74
Hypogonadism	14 (73.68)	20 (86.96)	0.49
Visual Impairment	8 (42.11)	9 (39.13)	1.00
Hypertension	7 (36.84)	15 (65.22)	0.13
Acne	7 (36.84)	6 (26.09)	0.68
Galactorrhea	6 (31.58)	0 (0)	*0.01
Diabetes	4 (21.05)	7 (30.43)	0.74

* *p* values calculated by the Fisher exact test, statistically significant when < 0.05. Results are expressed in percentage.

Treatment before the inclusion in the study

All patients were submitted to previous treatments, 76.19% were submitted to one surgery, 23.6% to two surgeries, and 34.37% of the operated patients were submitted to further radiotherapy. Primary treatment with somatostatin analogs was prescribed to 23.80% of patients and 11.30% of them was treated by combined cabergoline and octreotide.

Metabolic control at inclusion

Considering the current criteria for cure and control of Acromegaly (19,20), 26.32% of women and 4.35% of men were considered cured, 68.42% of women and 60.87% of men were considered controlled by medical treatment (p = 0.85), and the other patients were considered with uncontrolled disease, despite the previous and current treatments as surgery, radiotherapy, and somatostatin analogs (p = 0.11).

Distribution, frequency and intensity of pain symptoms

More than 80% of patients complained of arthralgia by time of inclusion in the study. In men, the most common sites of pain were the knees (73%), spine (47%), hands and wrists (40%). Most of the women presented multiple sites of pain. The most frequent site was the spine (47% lumbar, and 53% thoracic and cervical segments). The intensity of pain was evaluated by a Visual Analogue Scale and was reported as intense by 33.3% of women and 22.2% of men, moderate by 46.7% of women and 48.1% of men, and mild in 20% of women and 29.6% of men. Pain of severe intensity was reported more frequently on shoulders and spine. The frequency of pain was described as 3 to 5 days per week, in 53.3% of women and 7.4% of men, but 44.4% of men reported daily pain. There was no association between severity of pain and number of surgeries (r = 0.25, p = 0.19), or time to achieve metabolic control (r = 0.01, p = 0.08).

Postural defects

The analysis of the frequency of postural defects showed that 53% of men and 45% of women presented *Genu varus,* and *Genu valgus* was observed in 18% of women and 9% of men (Figure 1). Spine deviations (scoliosis, kyphosis or lordosis) were noted on 90% of patients, and 80% presented more than two deviations as asymmetry, scoliosis, cervical or lumbar lordosis, or hyperkyphosis (Figure 2). It was noted that 58% of patients had abdominal protrusions. Shoulder deviations were frequent, and more than two deviations (unilateral or bilateral asymmetry, internal rotation) were observed in 35% of men and 45% of women (Figure 3). There was no correlation between postural defects and disease activity (r = 0.6 p = 0.12), nor between postural defects and time of exposure to growth hormone hypersecretion (r = 0.3 p = 0.47).

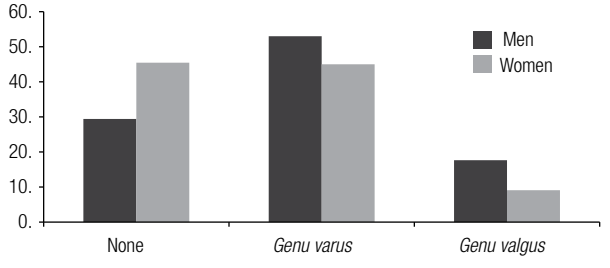

Figure 1. Frequency of knee deviations according to gender. Gray columns represent women, and black columns represent men. There was no statistical difference between genders for *Genu varus* ($p = 0.46$), *Genu valgus* ($p = 1.0$) or absence of abnormalities ($p = 0.44$). P-value calculated by Fisher test. $p < 0.05$ were considered statistically significant.

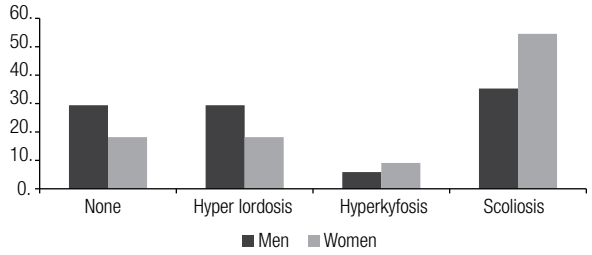

Figure 2. Frequency of spine deviations according to gender. Gray columns represent women, and black columns represent men. There was no difference between groups concerning hyperlordosis ($p = 1.0$), hyperkyfosis ($p = 1.0$), absence of abnormalities ($p = 0.67$), scoliosis ($p = .0.9$). P-value calculated by Fisher test, $p < 0.05$ were considered statistically significant.

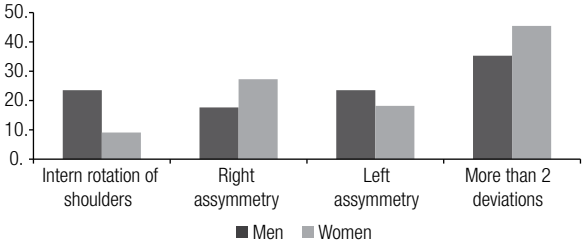

Figure 3. Frequency of shoulder deviations according to gender. There was no difference between genders on internal rotation ($p = 0.44$), right asymmetry ($p = 0.39$), right asymmetry ($p = 0.43$), more than 2 deviations right asymmetry ($p = 0.70$). Results are expressed in percentage. P-value calculated by Fisher test, $p < 0.05$ was considered statistically significant.

Level of physical activity and quality of life

The level of Physical Activity is expressed by weekly time spent on physical activity, from mild to vigorous intensity, in different contexts of life, and was compared with functional capacity score and emotional aspects. In patients with intermediate or high levels of physical activity, we observed a tendency to present higher scores on SF-36 (Table 4), concerning the domains social functioning (75 CI 57.3-92.6), general health (75.5 CI 60.4-90.5), and mental health (70 CI 57.8-82.1), although no significant statistical differences were observed comparing to patients with low physical activity level (p = 0.23, p = 0.11, p = 0.62, respectively).

The scores obtained on SF-36 domains were compared with the normal population, and were lower than Jenkinson and cols. data for all domains (35). In Role Physical and Pain, the study population obtained scores 56.67 ± 40.44 and 55.67 ± 23.59, but previously published data showed that in the healthy population, the scores were respectively 80.1 ± 34,9 and 84.8 ± 31.3 (Table 6). Patients with intermediate or high levels of physical activity frequently reported pain in anamnesis, but presented a tendency to have higher mean score in the domain pain on SF-36 (65.5, 48.61 ± 82.39) than patients with mild level of physical activity (52.27, 41.60 ± 62.95) ($p = 0.06$).

Domains of SF-36 categorized by level of disease activity

The patients were categorized in two groups by the level of activity of disease: controlled, when GH and IGF-1 were normal for age and gender; and uncontrolled, when GH or IGF-1 were higher than reference ranges. The scores for all domains of SF-36 presented a tendency to be higher in patients with controlled levels of GH and IGF-1, and statistical differences were found in the domains Role Physical ($p = 0.02$), Pain ($p = 0.03$), Vitality ($p = 0.02$), Role Emotional (p = 0.03) (Figure 4).

Table 4. Level of Physical Activity (IPAQ-6) and Dimensions of the Analysis of Quality of Life (SF-36)

Domains (SF-36)	Physical Activity Level (IPAQ-6)				
	Low		Intermediate/High		
	Mean	CI (95)	Mean	CI (95)	*p* value
Physical functioning	47.95	37.65-58.25	63.13	44.84-81.41	0.12
Role physical	52.27	34.20-70.34	53.13	15.34-90.91	0.96
Pain	52.27	41.60-62.95	65.5	48.61-82.39	0.06
General health	62.36	52.64-72.09	75.5	60.49-90.51	0.11
Vitality	55.45	45.76-65.15	59.38	46.85-71.90	0.59
Social functioning	63.07	50.44-75.69	75.00	57.34-92.66	0.23
Role emotional	51.52	32.86-70.17	58.33	25.87-90.80	0.68
Mental health	66.73	5838-75.07	70.00	57.88-82.12	0.62

* *p* values calculated by the Student *t* test, statistically significant when < 0.05. Results are expressed in means and confidence intervals (CI 95%).

Table 5. Dimensions of the Analysis of Quality of Life (SF-36) compared with clinical aspects

Domains (SF-36)	Pearson	Age at diagnosis	Delay symptoms - diagnosis	Time of exposure to GH excess	Tumor size	Time to achieve control	Number of surgeries
Physical functioning	Correlation	-0.13	-0.21	0.05	-0.42**	0.15	0.16
	P-value	0.49	0.26	0.81	0.02	0.43	0.39
Role physical	Correlation	0.07	-0.22	-0.08	-0.30	0.00	0.17
	P-value	0.71	0.24	0.68	0.11	1.00	0.36
Pain	Correlation	-0.13	-0.02	0.25	-0.17	0.01	0.25
	P-value	0.51	0.91	0.19	0.37	0.97	0.19
General health	Correlation	0.11	0.10	0.05	-0.13	0.02	0.03
	P-value	0.56	0.59	0.78	0.50	0.91	0.87
Vitality	Correlation	-0.02	-0.13	-0.03	-0.36	0.00	0.06
	P-value	0.93	0.51	0.86	0.05	0.98	0.75
Social functioning	Correlation	0.07	-0.36	-0.15	-.483	-0.22	-0.11
	P-value	0.73	0.05	0.43	0.01	0.24	0.57
Role emotional	Correlation	0.43*	-0.16	-0.32	0.41*	-0.21	-0.19
	P-value	0.02	0.39	0.09	0.02	0.26	0.31
Mental health	Correlation	-0.07	-0.15	0.14	-0.15	0.03	0.23
	P-value	0.70	0.44	0.48	0.43	0.87	0.23

Correlations calculated by Pearson test and p-values statistically significant when < 0.05.

Table 6. Scores found in the domains of SF-36 in acromegalic patients compared with the normal population (Jenkinson and cols., 1996)

Domains (SF-36)	Study cohort n = 42	Normal population (Jenkinson and cols., 1996) n = 712
Physical functioning	67.17 ± 23.88	79.4 ± 23.88
Role physical	56.67 ± 40.44	80.1 ± 34.90
Pain	55.67 ± 23.59	84.8 ± 31.30
General health	67.67 ± 17.03	86.9 ± 21.90
Vitality	56.50 ± 20.09	75.9 ± 17.40
Social functioning	68.13 ± 25.84	60.3 ± 20.50
Role emotional	58.73 ± 40.81	76.6 ± 25.0
Mental health	68.00 ± 17.60	68.4 ± 21.6

Results are expressed as means and standard deviations.

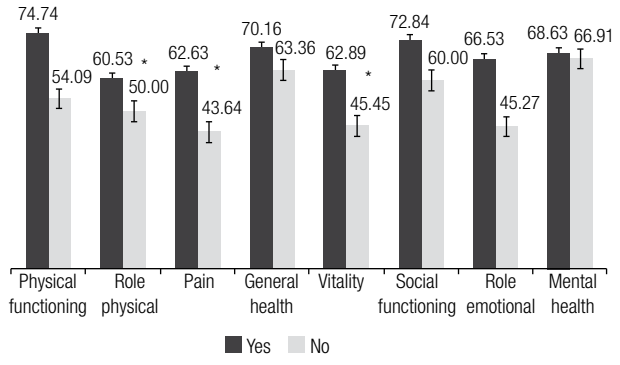

Figure 4. Dimensions of the Analysis of Quality of Life (SF-36) categorized in two groups, controlled and uncontrolled patients. Results are expressed as means and standard deviations (SD); P-value calculated by Fisher test, * $p < 0.05$ was considered statistically significant.

Table 7. Analysis of domains of SF-36 in patients categorized by activity of the disease, as cured or active acromegaly

Domains (SF-36)	Cured	Mean ± SD	Standard error	P value
Physical functioning	Yes	71.25 ± 29.55	14.77	0.72
	No	66.54 ± 23.53	4.61	
Role physical	Yes	6.25 ± 12.5	6.25	0.01*
	No	64.42 ± 37.53	7.36	
Pain	Yes	54.75 ± 28.37	14.19	0.94
	No	55.81 ± 23.42	4.59	
General health	Yes	57.00 ± 14.74	7.37	0.18
	No	69.31 ± 17.01	3.34	
Vitality	Yes	58.75 ± 30.65	15.33	0.81
	No	56.15 ± 18.83	3.69	
Social functioning	Yes	68.50 ± 26.26	13.13	0.98
	No	68.08 ± 26.30	5.16	
Role emotional	Yes	49.75 ± 42.99	21.50	0.66
	No	60.12 ± 41.17	8.07	
Mental Health	Yes	66.00 ± 31.07	15.53	0.81
	No	68.31 ± 15.01	2,94	

Results are expressed in means and standard deviations (SD). p-values statistically significant when < 0.05.

DISCUSSION

This is an original study evaluating the severity of impairment of daily life activities and clinical aspects in patients with acromegaly. The data showed a high per-

centage of postural defects in one or more regions in this cohort of patients. The patients reported pain in different muscle and joint groups and the most affected regions were knees and upper spine. The complaints about pain were daily in almost half of patients, and were proportional and more severe in patients with higher levels of physical activity. These results are in agreement with other authors and may be related to the overload in joints that may worsen previous articular disease (16,17,25).

The assessment of perception of the presence and intensity of pain was previously evaluated by a Visual Analogue Scale of discomfort, in other groups of subjects without chronic diseases, as healthy students (29), and women (31) submitted to mild or intermediate and high levels of physical activities. The group of acromegalic patients in our study reported multiple sites of discomfort, and also greater intensity of pain than normal subjects published in other studies (24,27,31).

The chronic exposure to GH oversecretion can be associated with osteoarticular damage and may lead to disability in daily life activities (DLA), with consequences in time spent on physical activities and quality of life. The patients evaluated in this study presented lower level of physical activities than age-matched control subjects, and data published in elderly populations. The problem can be worsened by the daily life activities, with constant changes in posture and the adoption of antalgic positions, postural errors and habits over time (32,33).

The pathogenesis of arthropathy in acromegaly may involve two mechanisms: initial endocrine and subsequent mechanical changes (12,13). At the initial stage, GH and IGF-1 lead to hyperfunction of articular chondrocytes and increased matrix synthesis, resulting in growth of periarticular structures. Synovial hypertrophy further exacerbates the abnormal mechanical loading in the joints, which is reversible by hormone control. In advanced cases, the ulceration of the joint cartilage promotes the osteoarthritis, which cannot be improved by GH and IGF-1 normalization (26).

Some authors have previously described that the influence of GH and IGF-1 in the osteoarticular system exposes the morphofunctional structure of the individual to possible hazards (16,17). In this study, the presence and severity of physical disability and pain were not correlated to initial GH and IGF-1 levels, time of previous exposure to GH excess, nor to metabolic control by the inclusion. A recent study investigated the clinical course of arthropathy and its relationship with radiographic progression in long-term controlled acromegaly patients, and suggested that joint function deteriorates during prolonged follow-up, despite biochemical control of the disease (36). It is currently unknown whether GH and IGF-1 control can reverse arthropathy in patients with acromegaly. However, improvement in signs and symptoms was demonstrated (34).

In our cohort, the patients considered controlled, with normal a normal age-adjusted IGF-1, presented higher scores in SF-36 in physical and emotional domains compared with patients with persistent hypersomatotrophism despite previous treatments and use of somatostatin analogs or dopamine agonists. These findings suggest benefits of metabolic control in quality of life. Studies have been published seeking to demonstrate that the improvement or possible extinction of chronic pain could improve the quality of life in different diseases (14,25,32). Other authors described that the impairment of quality of life may persist despite successful treatment in endocrine diseases (17,36).

In conclusion, the impairment in physical ability for daily life activities was shown in our study, and was not related to the type of treatment and activity of the disease in acromegalic patients. The data suggests benefits of acromegaly disease control in quality of life, based on better scores regarding emotional and physical domains of SF-36. Many unanswered questions about the benefits of controlled compared with uncontrolled disease regarding reversibility of articular co-morbidities have to be better evaluated in further studies.

Acknowledgements: we would like to acknowledge the Instituto and Laboratorio Sabin-Brasilia, that performed all hormonal tests and UniCEUB for all support.

Disclosure: no potential conflict of interest relevant to this article was reported.

REFERENCES

1. Melmed S. Medical progress: acromegaly. N Engl J Med. 2006;355(24):2558-73.
2. Saccà L, Cittadini A, Fazio S. Growth hormone and the heart. Endocr Rev. 1994;15(5):555-73.
3. Kauppinen-Mäkelin R, Sane T, Reunanen A, Välimäki MJ, Niskanen L, Markkanen H, et al. A Nationwide survey of acromegaly. J Clin Endocrinol Metab. 2005;90(7):4081-6. Epub 2005 May 10.
4. Melmed S. Pathogenesis of pituitary tumors. Nat Rev Endocrinol. 2011;7(5):257-66.
5. Daly AF, Tichomirowa MA, Petrossians P, Heliövaara E, Jaffrain-Rea ML, Barlier A, et al. Clinical characteristics and therapeutic

responses in patients with germ-line AIP mutations and pituitary adenomas: an international collaborative study. J Clin Endocrinol Metab. 2010;95(11):E373-83.

6. Naves LA, Daly AF, Vanbellinghen JF, Casulari LA, Spilioti C, Magalhães AV, et al. Variable pathological and clinical features of a large Brazilian family harboring a mutation in the aryl hydrocarbon receptor-interacting protein gene. Eur J Endocrinol. 2007;157(4):383-91.
7. Rajasoorya C, Holdaway IM, Wrightson P, Scott DJ, Ibbertson HK. Determinants of clinical outcome and survival in acromegaly. Clin Endocrinol (Oxf). 1994;41(1):95-102.
8. Scacchi M, Cavagnini F. Acromegaly. Pituitary. 2006;9(4):297-303.
9. Vitale G, Pivonello R, Auriemma RS, Guerra E, Milone F, Savastano S, et al. Hypertension in acromegaly and in the normal population: prevalence and determinants. Clin Endocrinol (Oxf). 2005;63(4):470-6.
10. Vilar L, Naves LA, Costa SS, Abdalla LF, Coelho CE, Casulari LA. Increase of classic and nonclassic cardiovascular risk factors in patients with acromegaly. Endocr Practice 2007;13(4):363-72.
11. Colao A, Pivonello R, Scarpa R, Vallone G, Ruosi C, Lombardi G. The acromegalic arthropathy. J Endocrinol Invest. 2005;28 (Suppl. 8):24-31.
12. Killinger Z, Payer J, Lazurova I, Imrich R, Homerova Z, Homerova Z, et al. Arthropathy in acromegaly. Rheum Dis Clin North Am. 2010;36(4):713-20.
13. Killinger Z, Kuzma M, Sterančáková L, Payer J. Osteoarticular changes in acromegaly. Int J Endocrinol. 2012;2012:839282.
14. Van der Klaauw AA, Kars M, Biermasz NR, Roelfsema F, Dekkers OM, Corssmit EP et al. Disease-specific impairments in Quality of Life during long-term follow up of patients with different pituitary adenomas. Clin Endocrinol (Oxf). 2008;69(5):775-84.
15. Biermasz NR, van Thiel SW, Pereira AM, Hoftijzer HC, van Hemert AM, Smit JW, et al. Decreased quality of life in patients with acromegaly despite long-term cure of growth hormone excess. J Clin Endocrinol Metab. 2004;89(11):5369-76.
16. Biermasz NR, Pereira AM, Smit JW, Romijn JA, Roelfsema F. Morbidity after long-term remission for acromegaly: persisting joint-related complaints cause reduced quality of life. J Clin Endocrinol Metab. 2005;90:2731-9.
17. Miller A, Doll H, David J, Wass J. Impact of musculoskeletal disease on quality of life in long-standing acromegaly. Eur J Endocrinol. 2008(158):587-93.
18. Ciconelli RM, Ferraz MB, Santos W, Meinão I, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação de qualidade de vida SF-36 (Brasil SF 36). Rev Bras Reumatol. 1999;39 (3):143-50.
19. Giustina A, Chanson P, Bronstein MD, Klibansly A, Lamberts S, Casanueva F, et al. A consensus on criteria for cure of acromegaly. J Clin Endocrinol Metab. 201095(7):3141-8.
20. Vieira Neto L, Abucham J, Araujo LA, Boguszewski CL, Bronstein MD, Czepielewski M, et al. [Recommendations of Neuroendocrinology Department from Brazilian Society of Endocrinology and Metabolism for diagnosis and treatment of acromegaly in Brazil]. Arq Bras Endocrinol Metabol. 2011;55(2):91-105.
21. Matsudo SMM, Araújo TL, Matsudo VKR, Andrade DR, Oliveira LC, Braggion GF. Questionário Internacional de Atividade Física (IPAQ): estudo de validade e reprodutibilidade no Brasil. Rev Bras Ativ Fís Saúde. 2001;6(2):5-18.
22. Franceschini J, Santos A, Mouallen I, Jamnik S, Uehara C, Fernandes A, et al. [Assessment of the quality of life of patients with lung cancer using the Medical Outcomes Study 36-item Short-Form Health Survey]. J Bras Pneumol. 2008;34(6):387-93.
23. Corlett N, Wilson, J, Manenika I. The ergonomics of working postures. London: Taylor & Francis; 1986.
24. Kendall FP, McCreary EK, Provance PG. Postura: alinhamento e equilíbrio muscular. In: Kendall FP, McCreary EK, Provance PG. Músculos provas e funções. 4.ed., São Paulo: Manole, 1995, p. 69-118.
25. Charlton E (ed.). Pain measurement in humans: core curriculum for professional education in pain. IASP Press; 2005. p. 25-53.
26. Colao A, Ferone D, Marzullo P, Lombardi G. Systemic complications of acromegaly: epidemiology, pathogenesis, and management. Endocrine Reviews. 2004;25(1):102-52.
27. Jensen MP Caroli P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. Pain; 1986. v. 27. p. 117-26.
28. Kerns RD, Turk DC, Rudy TE. The west haven-yale multidimensional pain inventory (WHYMPI). Pain; 1985. v. 23. p. 345-56.
29. Toscano JJ, Egypto EP. A influência do sedentarismo na prevalência de lombalgia. Rev Bras Med Esporte. 2001;7(4):56-62.
30. Sociedade Brasileira para o Estudo da Dor (SBED). Hospital sem dor: diretrizes para implantação da dor como 5º sinal vital. Disponível em: www.dor.org.b.r
31. Gervasio FM, Braga AKP, Fortunato CN, Magalhães DC, Resende KP, Santos RN. Alterações posturais clássicas e suas correlações em mulheres saudáveis na cidade de Goiânia – Goiás. Rev Movimenta. 2009;2(3):74-83.
32. Oliveira P, Monteiro P, Coutinho M, Salvador J, Costa ME, Malcata A. Qualidade de vida e vivência da dor crônica nas doenças reumáticas. Sociedade Portuguesa de Reumatologia. Acta Reumatol Port. 2009;34(3):511-9.
33. Kissner C, Colby LA. Exercícios terapêuticos – Fundamentos e Técnicas. 4. ed. São Paulo: Manole; 2005. p. 591-635.
34. Santos A, Resmini E, Martinez MA, Marti C, Ybarra J, Webb SM. Quality of life in patients with pituitary tumors. Curr Opin Endocrinol Diabetes Obes. 2009;16(4):299-303.
35. Jenkinson C, Layte R, Coulter A, Wright L. Evidence for the sensitivity of the SF-36 health status measure to inequalities in health: results from the Oxford healthy lifestyles survey. J Epidemiol Community Health. 1996;50(3):377-80.
36. Barkan A. Acromegalic arthropathy and sleep apnea. J Endocrinol. 1997;155(Suppl 1):S41-4.