ORIGINAL ARTICLE

Body self-image disturbances in women with prolactinoma

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Objective: To evaluate body dissatisfaction and distorted body self-image in women with prolactinoma.
Methods: Body dissatisfaction and distorted body self-image were evaluated in 80 women with prolactinoma. All patients were in menacme, 34% had normal body mass index (BMI), and 66% were overweight. Most patients (56.2%) had normal prolactin (PRL) levels and no hyperprolactinemia symptoms (52.5%). The Body Shape Questionnaire (BSQ) was used to assess the patients' dissatisfaction with and concern about their physical form, and the Stunkard Figure Rating Scale (FRS) was used to assess body dissatisfaction and distorted body self-image. The patients were divided according to PRL level (normal vs. elevated) and the presence or absence of prolactinoma symptoms.
Results: The normal and elevated PRL groups had similar incidences of body dissatisfaction and distorted body self-image. However, symptomatic patients reported a higher incidence of dissatisfaction than asymptomatic patients. Distorted body self-image was less common among symptomatic patients.
Conclusion: Symptomatic patients showed higher body dissatisfaction, but lower body self-image distortion. The presence of symptoms may have been responsible for increased body awareness. The perception of body shape could have triggered feelings of dissatisfaction compared to an ideal lean body. Therefore, a distorted body self-image might not necessarily result in body dissatisfaction in women with prolactinomas.

Keywords: Prolactinoma; hyperprolactinemia; body image; distortion; dissatisfaction; BMI

Introduction

Prolactinomas, the most prevalent pituitary adenomas, mainly affect women of childbearing age (gender ratio 10:1). They are a leading cause of infertility in this group.[1-4] Hyperprolactinemia causes hypogonadotropic hypogonadism and results in gonadal and sexual dysfunction (infertility, menstrual and weight changes, galactorrhea, and decreased libido), bone demineralization, decreased quality of life, and obesity.[5-10]

Microprolactinomas, tumors with dimensions of up to 1 cm, predominate over macroprolactinomas among women, who usually display the galactorrhea-amenorrhea syndrome, while men show symptoms of erectile dysfunction and decreased libido from hyperprolactinemia.[1,2,8,11,12] Due to the higher volume, macroprolactinomas can result in neuro-ophthalmologic compressive symptoms, such as injury to the optic nerve and peripituitary structures.[7,8,12,13]

It has been reported that variations in prolactin (PRL) concentrations in the central nervous system can affect emotions, mood, and well-being.[14,15] Stress could trigger neuroendocrine changes involving dopamine or serotonin, which affect PRL release.[14-16] McEwen & Stellar proposed the existence of a relationship between stress and disease development processes based on the concept of allostasis, i.e., the ability of the organism to achieve stability through change, which involves the interaction of different physiological systems.[17,18] Allostatic load thus reflects the results of either too much stress or an inability to maintain allostasis when faced with major or minor life events/challenges.[19] Depression, hostility, irritable mood, and anxiety are common in hyperprolactinemia.[18] Sonino et al.[20] have emphasized the role of emotional stress

from recent life events in prolactinomas and idiopathic hyperprolactinemia.[21]

The preferential treatment for prolactinoma is clinical and involves the use of dopamine agonists. These drugs are recommended for lowering PRL levels, decreasing tumor size, and restoring gonadal function in patients with symptomatic micro- and macroprolactinomas. The 2011 edition of the Endocrine Society's clinical practice guideline for the diagnosis and treatment of hyperprolactinemia recommends cabergoline over other dopamine agonists due to its higher efficacy in normalizing PRL levels, as well as its higher frequency of pituitary tumor shrinkage.[22] It is worth mentioning that cabergoline is recommended for women, independent of their desire to conceive.[23]

Follow-up for dopamine agonist treatment includes periodic PRL measurement to guide treatment intensity, achieve normal PRL levels and reverse hypogonadism, as well as magnetic resonance imaging (MRI) after 1 year (or after 3 months if the patient presents a macroadenoma, if PRL levels continue to rise while on dopamine agonist treatment, or if new symptoms occur). With careful clinical follow-up, therapy can be tapered off or even discontinued in patients treated with dopamine agonists for at least 2 years who no longer have elevated serum PRL or visible tumor remnants in an MRI.[22]

Hyperprolactinemia can lead to both physical and psychological changes, decreasing quality of life.[4,9,18,24-27] Although treatment with dopamine agonists is considered very successful, psychological distress has been reported to persist even after blood parameters have been normalized.[18,24] Optimal endocrine balance may not be fully restored, and subtle dysfunctions may influence psychological states.[24] Nevertheless, bromocriptine has been considered superior to placebo for depression symptom management in these patients.[18]

Body image can be interpreted as a mental representation of identity, i.e., how the body is presented and how it is experienced psychologically. This important and integrated psychological phenomenon involves a person's attitudes and feelings toward his or her body and its internal organization. Body dissatisfaction can be defined as a sense of annoyance or disgust regarding their appearance or the way the body is noticed or desired.[27-30] The perception of body image develops as a product of the individual's relationship with him- or herself and with others.[31,32] Van Kolck stated that since body self-image is acquired, dynamic changes in body weight may cause changes in the perception of one's own image.[32,33] At present, there are several theories about body image disturbances, and the trend among studies points to sociocultural factors as the main reasons for rejecting one's appearance.[29,34]

Considering the potential physical (obesity, overweight, and metabolic abnormalities) and psychiatric (depression, anxiety, and mood alterations) effects of prolactinomas, the present study aimed at evaluating the presence of body dissatisfaction and distorted body self-image in women with this type of pituitary tumor. Second, this study also compared the levels of body dissatisfaction and distorted body self-image according to: 1) biochemical control (normal vs. elevated PRL levels) and 2) hyperprolactinemia symptoms.

Methods

Of the 110 prolactinoma patients treated between March 2012 and January 2015 at the Hospital Universitário Clementino Fraga Filho, Universidade Federal do Rio de Janeiro, Brazil, 80 fulfilled the inclusion criteria and participated in the study. The inclusion criteria were females at least 18 years of age (in the range of menacme) who had been diagnosed with prolactinoma and were in any phase of treatment. The exclusion criteria were inability to read and respond to questionnaires, pregnancy, breastfeeding, chronic use of medications that could elevate PRL levels, and hypopituitarism.

Both micro- and macroprolactinoma patients were included in the study. Physiological and pharmacological causes of elevated PRL levels, as well as systemic disorders that could lead to hyperprolactinemia (galactorrhea and menstrual irregularity) were excluded. In the present study, a diagnosis of microprolactinoma in patients with hyperprolactinemia symptoms refers to PRL levels $\geqslant$ 50 ng/mL at diagnosis and tumors with a maximum diameter $<$ 1 cm (at MRI and/or computed tomography), while macroprolactinoma refers to PRL levels $\geqslant$ 200 ng/mL at diagnosis and a maximum tumor diameter $\geqslant$ 1cm.[22]

Height and weight were measured to calculate the body mass index (BMI). Patient charts were searched to collect data concerning PRL levels at diagnosis, treatment modality, time elapsed since diagnosis, and early and current symptoms. Patient PRL levels were also assessed at the time of inclusion. The Body Shape Questionnaire (BSQ)[35,36] and the Stunkard Figure Rating Scale (FRS)[37] were used to assess body self-image. No time limit was set for completing the scales. The first author was present during the application to answer any questions.

The BSQ assesses the level of body dissatisfaction through 34 questions whose answers are measured on a Likert scale (1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = very often; 6 = always). The final score is the sum of the answers. To assess distorted body self-image, the results were grouped according to score and classified as mild distortion (from 70 to 90 points), moderate distortion (from 90 to 110 points), or intensive distortion (more than 110 points).[30,38] The individual score and the mean total score can be allocated in these severity subgroups.

The participants were then asked to examine the Stunkard FRS for female adults, which contains nine silhouettes ranging from leaner (score = 1) to more obese (score = 9), and indicate which silhouette they identified with at the time of study entry and which they wished to have. The degree of body dissatisfaction was calculated by subtracting the value of the silhouette the patient identified with at study entry from the desired silhouette, whereas the degree of body self-image distortion was calculated by subtracting the values of the silhouette that the patient identified with from the one corresponding to their current BMI. If the difference was positive, the

patient underestimated, and if the difference was negative, the patient overestimated.

The study was approved by the hospital's research ethics committee.

Statistical analysis

The data are presented as the mean ± standard deviation. The group means were compared using an unpaired Student's *t*-test (parametric) or the Mann-Whitney *U* test (non-parametric). Categorical variables were compared using Fisher's exact test. The significance level was set at 5%. The statistical analyses were performed using GraphPad Prism version 6.05 for Windows (GraphPad Software, San Diego, USA), GraphPad Instat version 3.05 for Win 95/NT (GraphPad Software, San Diego, USA), and Epi Info™ version 7.1.0.6 (Centers for Disease Control and Prevention, USA).

Results

A total of 80 patients with a mean age of 36.8±8.5 years and a mean BMI of 28.21±6.10 kg/m^2 were evaluated. The mean PRL levels at diagnosis and study entry were 862.95±3,849.29 and 69.93±164.10 ng/mL, respectively. The mean age at diagnosis was 27.56±8.51 years. Treatment duration ranged between 0 and 30 years (mean = 9.0±6.1 years) (Table 1).

The majority of participants (78.8%) were employed, married (52.5%), and did not have children (58.8%). Most of them (66.3%) had an above-normal BMI (31.3% overweight and 35% obese). By the time of inclusion, 66.3% had microprolactinomas. Surgery had been performed on 10% of the subjects, and 86.3% were in clinical treatment with dopamine agonists (cabergoline was used in 80% of the cases).

Menstrual changes, especially amenorrhea, were the most common symptom at the time of prolactinoma diagnosis (88.8%), followed by galactorrhea (78.8% – Table 2). Upon inclusion, 25% had menstrual changes or amenorrhea. Patients were divided according to PRL level (normal vs. elevated) and the presence or absence of hyperprolactinemia symptoms. The results of these different groups were compared. Table 3 compares the general characteristics of the sample at diagnosis and currently.

More than half of the patients (n=45; 56.2%) had PRL levels within the normal range (2-23 ng/mL). In this group, the mean PRL value was 11.6 ± 6.6 ng/mL, while the group with elevated levels reached as high as 144.8±228.5 ng/mL (p = 0.0002). The normal PRL group included more patients being treated with dopamine agonists (93.3 vs. 71.4%; p = 0.0097). Both groups were similar in terms of age at the time of diagnosis and at study entry. Other variables that were not significantly different among the normal and elevated PRL groups included: time elapsed since prolactinoma diagnosis, frequency of macroprolactinomas at diagnosis or at the time of the study, frequency of pretreatment with pituitary surgery, frequency of patients with symptoms of hyperprolactinemia at study entry, and BMI.

A total of 42 patients (52.5%) had no hyperprolactinemia-related symptoms. The frequency of patients being treated with dopamine agonists was lower in the group with symptoms (WS) than the group with no symptoms (NS) of hyperprolactinemia (40.3 vs. 59.7%, p = 0.0051; odds ratio [OR] = 0.1227; 95% confidence interval (95% CI) for OR = 0.02517-0.5983) (Figure 1). In both groups, macroprolactinomas predominated at diagnosis. There were no significant differences between the groups for the following variables: age at the time of diagnosis and at study entry, treatment duration, and BMI. PRL levels at the time of study entry were also not significantly different between the groups.

Table 4 presents the results of the Stunkard FRS scale and BSQ evaluations.

Distress and body self-image in patients with normal and elevated PRL levels

According to the Stunkard scale, 86.6% of patients with normal PRL levels and 80% of those with elevated PRL

Table 2 Symptoms of 80 women with prolactinoma

	At diagnosis	Currently
Menstrual changes/amenorrhea	71 (88.8)	20 (25.0)
Galactorrhea	63 (78.8)	11 (13.8)
Headache	48 (60.0)	13 (16.3)
Visual change	21 (26.3)	9 (2.5)
Decreased libido	25 (31.3)	12 (15.0)
Weight change	42 (52.5)	11 (13.8)
Infertility	0 (0)	9 (11.3)

Data presented as n (%).

Table 1 Characteristics of 80 women with prolactinoma

	n	Minimum	Maximum	Mean	SD
Microprolactinoma	53				
Age at diagnosis (years)	80	12	51	27.56	8.51
Current age (years)	80	21	55	36.82	8.59
First BMI (kg/m^2)	80	18	44	26.77	5.24
Current BMI (kg/m^2)	80	18	45	28.21	6.10
First PRL (ng/mL)	80	62	33,780	862.95	3,849.29
Current PRL (ng/mL)	80	1	1,250	69.93	164.10
Treatment duration (years)	80	0	30	9.09	6.10
Cabergoline	64				
Surgical treatment	10				

BMI = body mass index; PRL = prolactin; SD = standard deviation.

Table 3 Comparison of patient characteristics according to prolactin level and presence of symptoms

	Normal PRL	Elevated PRL	p-value	WS	NS	p-value
n	45	35	-	38	42	-
Current PRL (ng/mL)	11.6±6.6	144.8±228.5	**0.0002**	106.4±229.0	37.0±47.1	0.3938
Dopamine agonist treatment (%)	93.3	71.4	**0.0097**	95.2	71.0	**0.0037**
Age at diagnosis (years)	28.3±9.1	26.5±7.7	0.3984	28.1±8.5	27.0±8.6	0.6366
Age at study entry (years)	37.5±8.6	35.9±8.6	0.3984	37±9.1	36.7±8.2	0.9577
Time since diagnosis of prolactinoma (years)	9.1±6.1	9.1±6.2	0.9690	8.3±6.4	9.8±5.8	0.2500
Macroprolactinomas at diagnosis (%)	66.7	51.4	0.1251	65.8	54.7	0.2188
Macroprolactinomas at study entry (%)	31.1	37.1	0.3707	39.5	29.6	0.3493
Symptoms of hyperprolactinemia at study entry (%)	42.2	54.3	0.1988	100.0	0.0	**0.0001**
BMI (kg/m²)	28.5±6.0	27.8±6.3	0.4407	28.5±6.7	27.9±5.5	0.9539

Bold font indicates statistical significance.
BMI = body mass index; NS = no symptoms; PRL = prolactin; WS = with symptoms.
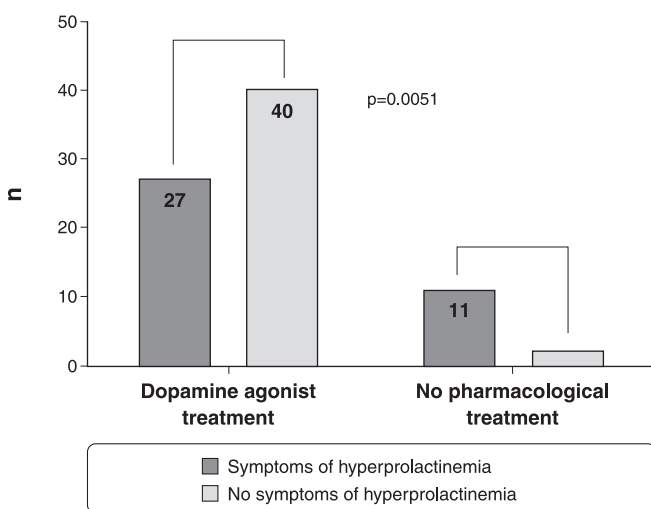

Figure 1 Frequency of patients treated with dopamine agonists according to the presence of hyperprolactinemia symptoms (Fisher's exact test was used to calculate the difference between groups; the Woolf logit interval was used to compute the 95% confidence intervals).

levels (p = 0.3081) were dissatisfied with their bodies. A distorted body image was found in just under than three-fourths of the normal PRL group (73.3%) and in 77.1% of the elevated PRL group (p = 0.4505). In both groups, a small majority of patients underestimated their body dimensions (53.3% in the normal group vs. 51.4% in the elevated group). Based on the BSQ results, most patients in both groups had light or no body dissatisfaction (75.6% in the normal PRL group vs. 60% in the elevated PRL group). No statistically significant differences were found between the Stunkard FRS and BSQ data of patients treated with cabergoline and bromocriptine.

Distress and body self-image in symptomatic and asymptomatic patients

There was no significant difference between the NS and WS groups in frequency of body dissatisfaction according to the Stunkard FRS (WS: 86.8 vs. NS: 80.9%, p = 0.3428). A total of 36.8% of the WS group had no body image distortion, 36.8% underestimated their body dimensions, and 26.3% overestimated them. The majority

of the NS group (66.6%) underestimated their body dimensions, 19% overestimated them and 14.3% had no distortion.

The frequency of patients with a distorted body self-image was lower in the WS group than the NS group (85.7 vs. 63.1%, p = 0.0037; OR = 0.2857, 95%CI for OR = 0.0963-0.8474) (Figure 2). The WS group had more cases of moderate and severe body dissatisfaction than the NS group (44.7 vs. 19%; p = 0.0124; OR = 3.44, 95% CI for OR = 1.264-9.364).

According to the BSQ results, most patients in both groups had light or no dissatisfaction (WS: 55.3%; NS: 81%).

Discussion

To our knowledge, this is the first study to investigate the body self-image distortion and body dissatisfaction in women with prolactinoma. There was no significant difference in body dissatisfaction or distorted body self-image between the normal and elevated PRL groups. However, there was a higher incidence of body dissatisfaction among symptomatic patients than the asymptomatic patients, and a distorted body self-image was less common among symptomatic patients

Hyperprolactinemia can lead to hypogonadotropic hypogonadism and sexual dysfunction.[8,39] Female sexual dysfunction is defined as a disorder of sexual desire, arousal, orgasm, or dyspareunia that leads to personal suffering.[40]

Krysiak et al.[39] found that hyperprolactinemia was present in approximately 80% of individuals with psychiatric symptoms. Based on these findings, the authors reported that hyperprolactinemia is a risk factor for emotional disorders, with more than three times the incidence among these individuals than the general population.

The present study involved patients undergoing short- and long-term prolactinoma treatment (time elapsed since diagnosis = 0 to 30 years). Considering the heterogeneity of our sample, it was impossible to evaluate life events in this study. As previously mentioned, patients with prolactinoma tend to encounter a greater number of stressful life events. For example, an important study by Nunes et al.[41] suggested that paternal deprivation is highly prevalent in women with pathological hyperprolactinemia. It has been hypothesized that stressful life events could

Table 4 Stunkard Figure Rating Scale and Body Shape Questionnaire data

	Normal PRL	Elevated PRL	p-value	NS	WS	p-value
Dissatisfaction	86.6	80.0	0. 3081	80.9	86.8	0.3428
Distortion	73.3	77.1	0.4505	85.7	63.2	**0.0188**
Underestimation	53.3	51.4		66.6	36.8	
Overestimation	20.0	25.7		19.0	26.3	
No dissatisfaction	48.8	31.4	-	50.0	31.6	-
Light dissatisfaction	26.6	28.5		30.6	23.7	
Moderate dissatisfaction	11.1	17.1		9.5	18.4	
Severe dissatisfaction	13.3	22.8		9.5	26.3	

Data presented as %.
Bold font indicates statistical significance.
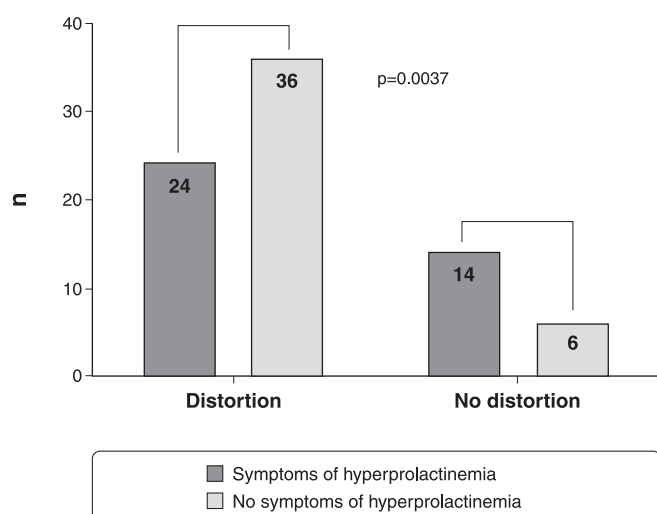NS = no symptoms; PRL = prolactin; WS = with symptoms.

Figure 2 Frequency of patients with distorted body self-image according to hyperprolactinemia symptoms (Fisher's exact test was used to calculate the difference between groups; the Woolf logit interval was used to compute the 95% confidence intervals).

function as suprahypothalamic stimuli, activating lactotrophs and promoting pre-existent, silent prolactinomas.[21]

At the time of the study, as expected, the number of patients under treatment with dopamine agonists was higher in the group with no hyperprolactinemia symptoms (95.2 vs. 71%; p = 0.0037). Prolactinomas respond very well to pharmacological treatment. Cabergoline is the dopamine agonist of choice for treating prolactinoma and is provided by the public health system in Brazil. However, it can be inferred that symptomatic patients in this study might not have been using their prescribed medication due to: 1) cost, 2) interruption or failure of free distribution by the health system, 3) severe side effects, or 4) lack of treatment adherence. The irregular administration of dopamine agonists could also explain the similar prevalence of hyperprolactinemia symptoms between the normal and elevated PRL groups.

Poor treatment adherence has been associated with multiple cognitive styles: 1) those who feel that their health is controlled both by external factors and their own beliefs; 2) those with higher psychological reactance (who tend to focus on their own resources, personal decisions,

and initiatives); 3) those with pharmacophobia (one-sixth of the patients); and 4) those skeptical about medications (high concern about adverse effects and low belief in the need to take them). It seems that adherence is strongly influenced by the dual health control hypothesis, i.e., a balance between the internal and external health control beliefs.[42]

In contrast to most reports involving women with prolactinomas, our sample included a higher prevalence of macroprolactinomas. This might have been due to the fact our study was developed in an endocrine clinic considered a reference for treating hyperprolactinemia: we received a significant number of patients with tumoral hyperprolactinemia, particularly complex cases of prolactinomas.

Contrary to studies identifying weight gain and obesity in prolactinoma,[43,44] weight gain was not found to be a significant complaint, but a distorted body self-image was highly prevalent in the sample. It is important to point out that some of the included patients were undergoing treatment with dopamine agonists. Naliato et al.[45] found that treatment with dopamine agonists led to reduced body fat in women with prolactinoma, probably due to the metabolic effects of activating dopamine receptors.

As mentioned earlier, hyperprolactinemia has been associated with psychiatric morbidity, and depressive symptoms are often found in patients with tumoral or idiopathic hyperprolactinemia.[18] Since we did not evaluate comorbidities with other psychiatric disorders, we could not investigate their influence on body image.

No difference was observed in the prevalence of patients with body dissatisfaction or distorted body self-image between the normal and elevated PRL groups. However, most asymptomatic patients (85.6%) had a distorted body self-image, predominantly underestimating (66.6%) their body size. These patients perceived themselves to be thinner than they really were, which could have protected them from emotional discomfort or lower self-esteem. In the absence of emotional discomfort, the body image dissatisfaction level was only 19%.

The group of symptomatic patients reported a higher incidence of body dissatisfaction (44.7%) and less distortion (63.1%) than the asymptomatic group. Prolactinoma symptoms may have been responsible for arousing attention and body awareness, which triggered a sensation of unease and body dissatisfaction, considering that 53 of the 80 women had an above-normal BMI.

There are several hypotheses about the origin of body image disorder. Studies suggest sociocultural factors in western societies as the main reasons for rejection or satisfaction with one's body self-image.[29,34,40,46] Evidence increasingly indicates that perceptual disorder may not be responsible for body image disorder. Cognitive fixation on slimness and fear of weight gain could be involved.[46] Body dissatisfaction could be the result of unrealistic ideals about thinness that are believed to be promoted by society. Problems with body image are a major source of social anxiety and require further study.[46]

In an evaluation of body image perception in acromegaly and clinically non-functional pituitary adenomas, we observed that negative perception had no relationship with the objective appearance of the body. Depressive symptoms were associated with the worst body image perception scores; no association was found between body image and cognitive impairment, hormonal excess, or treatment status.[47] Prolactinoma symptoms may trigger various body swings through direct and indirect hormonal changes and lead to edema, pain, and discomfort, which result in diminished quality of life, low self-esteem, and suffering.[27]

Illness behavior, according to Mechanic,[48] refers to "the varying ways individuals respond to bodily indications, how they monitor internal states, define and interpret symptoms, make attributions, take remedial actions and utilize various sources of informal and formal care." Illness behavior could have significantly influenced body self-image perception in the present study.

In our study, distorted body self-image and underestimating weight and body size in the NS group could be one reason for the lower incidence of body dissatisfaction. With the cessation of symptoms during treatment, these women regained self-esteem; due to a state of bliss, they created a cognitive state of denial (underestimation) and a positive distortion of body self-image. The symptomatic group reported body dissatisfaction in both scales and less distortion of body self-image, indicating a more accurate perception of corporeal dimension. This probably resulted from body awareness gained through discomfort from the disease and supports the existence of a societally imposed idea that a slim body is perfect.

This study involves certain limitations. First, the sample was too small to generalize the results. Second, although the questionnaires' (BSQ and Stunkard FRS) scoring systems are subjective, to our knowledge they are the best way available to systematically evaluate the involved feelings. Moreover, we could have investigated mental disorder comorbidities, which might have lead to new insights into the results. Third, the patient group was heterogeneous, since some were newly diagnosed (and consequently were studied prior to treatment) and others were undergoing different treatment types (surgery, cabergoline, and bromocriptine). Fourth, there was no control group. Finally, our study dealt with subjective self-reports of unique and natural sensations. However, the results of this small cohort are sufficient to draw attention to this rarely addressed aspect of prolactinoma.

In conclusion, body dissatisfaction and a distorted body self-image are frequent in women with prolactinomas.

Body dissatisfaction was especially frequent in those with hyperprolactinemia symptoms. Prolactinoma symptoms might have been responsible for more attention and body awareness. Considering that 53 of the 80 participants had an above-normal BMI, increased body awareness could have triggered a sensation of unease and dissatisfaction with their bodies. Conversely, a distorted body self-image (underestimating weight and body size) was more frequent among asymptomatic patients. Such distortion may not necessarily result in body dissatisfaction in women with prolactinoma, as was observed in this study. Nevertheless, no significant difference was found between biochemically well-controlled vs. poorly controlled patients. Although the present study provides limited and preliminary data, clinicians must be aware that adequate PRL control is insufficient to avoid body self-image disturbances and they must be vigilant in detecting body image issues in these patients.

Disclosure

The authors report no conflicts of interest.

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