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FEATURES OF SOMATOTYPE COMPONENTS AND INDICATORS OF COMPONENT COMPOSITION OF BODY WEIGHT IN UKRAINIAN MEN AND WOMEN WITH MULTIPLE SCLEROSIS

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In Ukrainian young men and women with multiple sclerosis, compared with practically healthy men and women, numerous significant or trends in the differences in the components of the Heath-Carter somatotype (mainly in women) and indicators of the component composition of body mass were established. Most of the differences in the components of the Heath-Carter somatotype and indicators of the component composition of body mass between patients with multiple sclerosis with mild, moderate and moderately severe disorders were established in men. Pronounced manifestations of sexual dimorphism were established only for most indicators of the component composition of body mass (except for fat) between men with multiple sclerosis (larger values in the general groups and in the groups of patients with mild and moderately severe disorders) and women.

Key words: nervous diseases, multiple sclerosis, somatotype, component composition of body mass, practically healthy and sick men and women.

М.М. Гунас, Г.С. Московко, О.Г. Іщук, І.В. Олексієнко, В.І. Кириченко, І.В. Гунас ОСОБЛИВОСТІ КОМПОНЕНТІВ СОМАТОТИПУ ТА ПОКАЗНИКІВ КОМПОНЕНТНОГО СКЛАДУ МАСИ ТІЛА В УКРАЇНСЬКИХ ЧОЛОВІКІВ І ЖІНОК, ХВОРИХ НА МНОЖИННИЙ СКЛЕРОЗ

В українських чоловіків і жінок молодого віку, хворих на множинний склероз, порівняно з практично здоровими чоловіками та жінками встановлені багаточисельні достовірні або тенденції відмінностей компонентів соматотипу за Хіт-Картер (переважно у жінок) і показників компонентного складу маси тіла. Більшість відмінностей компонентів соматотипу за Хіт-Картер і показників компонентного складу маси тіла між хворими на множинний склероз із легкими, помірними та помірно-тяжкими порушеннями встановлена у чоловіків. Виражені прояви статевго диморфізму встановлені лише для більшості показників компонентного складу маси тіла (за винятком жирового) між хворими на множинний склероз чоловіками (більші значення в загальних групах і в групах хворих із легкими та помірно-тяжкими порушеннями) та жінками.

Ключові слова: нервові захворювання, множинний склероз, соматотип, компонентний склад маси тіла, практично здорові й хворі чоловіки та жінки.

The study is a fragment of the research project "Constitutional features of body structure in people with multiple sclerosis and its impact on the course of the disease", state registration No. 0121U114309.

Multiple sclerosis (MS) is a chronic autoimmune demyelinating disease of the central nervous system, characterized by a wide spectrum of clinical manifestations, a progressive course, and varying degrees of disability [13]. In recent decades, the incidence of MS has increased in different regions of the world, which is associated with both a real increase in the incidence of the disease and improved diagnostic criteria [3, 4]. For example, global data indicate that in 2022 the prevalence of MS reached more than 2.8 million cases, with significant variability in different countries and regions [5]. In particular, in European countries, the rates range from 80 to more than 200 cases per 100,000 population, indicating a significant epidemiological burden [6].

Between 2015 and 2022, a steady increase in the incidence of MS was recorded in a number of European countries, especially among women, who are affected approximately 2-3 times more often than men [1]. The dynamics of epidemiological indicators indicate a change in the clinical and demographic profile of patients with MS, which is likely due to the influence of external factors, urbanization, changes in lifestyle and nutrition [4]. At the same time, more and more attention is paid to the study of the morphofunctional characteristics of the body of patients with MS, in particular, body composition, distribution of fat and muscle mass, as well as the characteristics of the somatotype.

Modern approaches to the management of patients with MS involve an individualized assessment of not only neurological status, but also general somatic condition. The study of anthropometric parameters, including body mass components, may have practical value for predicting the course of the disease, assessing the response to treatment, and developing rehabilitation strategies. Despite the increasing number of studies analyzing the epidemiological and clinical aspects of MS, the morphological features of patients remain poorly understood, especially taking into account gender differences and regional characteristics

[13]. In this regard, the study of body composition characteristics of MS patients is of particular relevance for the Ukrainian population.

The purpose of the study was to establish the characteristics and gender differences of the components of the Heath-Carter somatotype and indicators of the component composition of body mass in young Ukrainian men and women with multiple sclerosis with varying degrees of disability.

Materials and methods. Clinical-laboratory and anthropo-somatotypological (according to the schemes of Bunak V. V. (1941) as modified by Shaparenko P. P. (2000), Carter J. and Heath B. (1990), Matiegka J. (1921) and the American Institute of Nutrition (Shephard R. J., Shephard R. F., 1991)) examination of 35 Ukrainian men and 59 women of young age (25–44 years according to the WHO age periodization, 2015) patients with multiple sclerosis was carried out on the basis of the Department of Nervous Diseases of the National Pirogov Memorial Medical University, Vinnytsya and the “Salyutem” Medical Center (Vinnytsya). Committee on Bioethics of National Pirogov Memorial Medical University, Vinnytsya (protocol No. 10 from 10.12.2021) found that the studies do not contradict the basic bioethical standards of the Declaration of Helsinki, the Council of Europe Convention on Human Rights and Biomedicine (1977), the relevant WHO regulations and laws of Ukraine.

The diagnosis of multiple sclerosis was made according to the McDonald criteria [12]. The degree of disability was assessed using the Expanded Disability Status Scale. The following distribution of patients was established: with mild impairments (EDSS 2.0-3.0) – 24 men and 26 women; with moderate impairments (EDSS 3.5-4.5) – 7 men and 24 women; with moderately severe impairments (EDSS 5.0-6.5) – 4 men and 9 women.

As controls, the primary indicators of the components of the somatotype according to Heath-Carter and indicators of the component composition of body mass of 82 practically healthy Ukrainian men and 101 Ukrainian women of a similar age were used, taken from the data bank of the National Pirogov Memorial Medical University, Vinnytsya Research Center.

Table 1

Differences in the components of the somatotype according to Heath-Carter in practically healthy and multiple sclerosis patients of Ukrainian men and women

Parameters and groups	Men (M±σ)		
	FX (scores)	MX (scores)	LX (scores)
1. Practically healthy	3.230±1.046	4.689±1.332	2.512±1.253
2. Patients in general	2.916±1.127	4.602±1.881	2.383±1.783
3. EDSS 2.0-3.0	2.963±1.114	4.825±1.933	2.135±1.607
4. EDSS 3.5-4.5	2.543±1.240	3.393±1.581	3.751±1.933
5. EDSS 5.0-6.5	3.282±1.139	5.386±1.352	1.478±1.673
p1-2	>0.05	>0.05	>0.05
p1-3	>0.05	>0.05	>0.05
p1-4	>0.05	<0.05	=0.070
p1-5	>0.05	>0.05	>0.05
p3-4	>0.05	=0.059	<0.05
p3-5	>0.05	>0.05	>0.05
p4-5	>0.05	=0.089	=0.089
Parameters and groups	Women (M±σ)		
	FX (scores)	MX (scores)	LX (scores)
1. Practically healthy	3.249±1.000	3.761±1.463	2.738±1.374
2. Patients in general	3.038±1.182	4.338±1.503	2.192±1.508
3. EDSS 2.0-3.0	3.061±1.305	4.058±1.311	2.202±1.427
4. EDSS 3.5-4.5	3.075±1.105	4.901±1.455	1.899±1.201
5. EDSS 5.0-6.5	2.874±1.123	3.647±1.782	2.947±2.254
p1-2	>0.05	<0.05	<0.05
p1-3	>0.05	>0.05	>0.05
p1-4	>0.05	<0.01	<0.05
p1-5	>0.05	>0.05	>0.05
p3-4	>0.05	<0.05	>0.05
p3-5	>0.05	>0.05	>0.05
p4-5	>0.05	>0.05	>0.05

Notes: in this and the following table, significantly ($p<0.001$, $p<0.01$ and $p<0.05$, respectively) higher values of indicators between the corresponding groups of men and women are marked in orange, light green or yellow; p1-2, p1-3, p1-4, p1-5, p3-4, p3-5 and p4-5 – the reliability of the differences in indicators between the corresponding groups of men or women.

The results were processed in the licensed package “Statistica 6.0” using non-parametric evaluation methods. The mean (M) and standard deviation (σ) for each trait were determined. The significance of the difference in values was determined using the Mann-Whitney U test.

Results of the study and their discussion. The results of determining the components of the Heath-Carter somatotype (FX – endomorphic, MX – mesomorphic and LX – ectomorphic) in young Ukrainian men and women with multiple sclerosis with mild, moderate and moderately severe disorders are presented in Table 1.

When analyzing the differences in the components of the somatotype according to Heath-Carter between practically healthy men or women and those with multiple sclerosis, it was established (see Table 1): in men with multiple sclerosis – in patients with moderate disorders, a significantly lower value ($p < 0.05$) of the mesomorphic component of the somatotype (by 27.64 %) and a tendency ($p = 0.070$) to higher values of the ectomorphic component of the somatotype (by 33.03 %) were established; in female patients with multiple sclerosis – in the general group of patients and in patients with moderate disorders, significantly ($p < 0.05$ – 0.01) higher values of the mesomorphic component of the somatotype (by 13.30 % and 23.26 %, respectively) and significantly ($p < 0.05$ in both cases) lower values of the ectomorphic component of the somatotype (by 19.94 % and 30.64 %, respectively) were established.

When analyzing the differences in the components of the somatotype according to Heath-Carter between male or female patients with multiple sclerosis with different degrees of disability, it was established (see Table 1): in male patients with multiple sclerosis, in patients with moderate disorders, there were trends ($p = 0.059$ and $p = 0.089$) to lower values of the mesomorphic component of the somatotype compared to patients with mild and moderately severe disorders (by 29.68 % and 37.00 %, respectively); in female patients with multiple sclerosis, there was also a significant ($p < 0.05$) greater or ($p = 0.089$) trend to higher values of the ectomorphic component of the somatotype compared to patients with mild and moderately severe disorders (by 43.08 % and 60.60 %, respectively). When analyzing the sex differences in the components of the Heath-Carter somatotype among patients with multiple sclerosis, it was found (see Table 1): in patients with moderate disorders, men have a significantly ($p < 0.05$) higher value of the ectomorphic component of the somatotype (by 49.37 %), and in patients with moderate disorders, women have a significantly ($p < 0.05$) higher value of the mesomorphic component of the somatotype (by 30.77 %).

The results of determining the indicators of the component composition of body weight (MM – muscle mass according to Matiegka, MA – muscle mass according to the American Institute of Nutrition, DM – fat mass according to Matiegka and OM – bone mass according to Matiegka) in young Ukrainian men and women with multiple sclerosis with mild, moderate and moderately severe disorders are given in Table 2.

When analyzing the differences in body mass component composition indicators between practically healthy men or women and those with multiple sclerosis, it was established: in men with multiple sclerosis – in the general group of patients and in patients with mild and moderately severe disorders, significantly ($p < 0.05$ – 0.001) greater or trends ($p = 0.057$ and $p = 0.077$) to higher values of the muscle component of body mass according to Matiegka (by 14.54 % – 17.68 % – 18.50 %, respectively) and according to the American Institute of Nutrition (by 9.99 % – 11.73 % – 25.29 %, respectively), as well as significantly ($p < 0.01$) greater values in patients with moderately severe disorders of the bone component of body mass according to Matiegka (by 16.08 %); in female patients with multiple sclerosis – in the general group of patients and in patients with mild and moderate disorders, significantly ($p < 0.05$ – 0.001) higher values of the muscle component of body mass according to Matiegka (respectively by 11.23 % – 10.77 % – 13.95 %) and the bone component of body mass according to Matiegka (respectively by 7.13 % – 3.93 % – 11.90 %), as well as significantly ($p < 0.01$ – 0.001) higher values in the general group of patients and in patients with moderate disorders of the muscle component of body mass according to the American Institute of Nutrition (respectively by 11.57 % and 16.86 %).

When analyzing the differences in the indicators of the component composition of body mass between patients with multiple sclerosis, men or women with different degrees of disability, it was established: in patients with multiple sclerosis, men – in patients with moderate disorders, there were significantly ($p < 0.05$) lower or trends ($p = 0.059$ – 0.098) to lower values of the muscle component of body mass according to Matiegka (by 19.03 % and 19.84 %, respectively), according to the American Institute of Nutrition (by 20.02 % and 32.30 %, respectively) and the bone component of body mass according to Matiegka (by 6.51 % and 17.91 %, respectively) compared to patients with mild and moderately severe disorders, as well as in patients with moderately severe disorders, there was a trend ($p = 0.066$) to higher values of the bone component of body mass according to Matiegka (by 12.20 %) compared to patients with mild disorders; in female patients with multiple sclerosis – in patients with moderate disorders, significantly

($p < 0.05$ in both cases) higher values of the muscle component of body weight according to the American Institute of Nutrition (by 11.39 %) and the bone component of body weight according to Matiegka (by 8.30 %) compared to patients with mild disorders, as well as significantly ($p < 0.05$) higher values of the bone component of body weight according to Matiegka (by 9.72 %) compared to patients with moderate-severe disorders were established.

Table 2

Differences in body mass component composition in practically healthy and multiple sclerosis patients of Ukrainian men and women

Parameters and groups	Men ($M \pm \sigma$)			
	MM (kg)	MA (kg)	DM (kg)	OM (kg)
1. Practically healthy	34.22±5.88	38.67±7.20	10.96±3.50	11.01±1.30
2. Patients in general	40.04±9.01	42.96±11.49	11.24±4.12	11.55±1.96
3. EDSS 2.0-3.0	41.57±8.79	43.81±11.72	11.35±3.69	11.52±1.64
4. EDSS 3.5-4.5	33.66±8.95	35.04±8.85	9.669±5.449	10.77±2.92
5. EDSS 5.0-6.5	41.99±6.91	51.76±5.69	13.33±4.08	13.12±1.10
p1-2	<0.01	=0.077	>0.05	>0.05
p1-3	<0.001	=0.057	>0.05	>0.05
p1-4	>0.05	>0.05	>0.05	>0.05
p1-5	<0.05	<0.01	>0.05	<0.01
p3-4	=0.059	<0.05	>0.05	=0.098
p3-5	>0.05	>0.05	>0.05	=0.066
p4-5	=0.089	<0.05	>0.05	=0.089
Parameters and groups	Women ($M \pm \sigma$)			
	MM (kg)	MA (kg)	DM (kg)	OM (kg)
1. Practically healthy	27.51±4.49	26.29±5.75	10.57±2.94	8.173±1.150
2. Patients in general	30.99±5.46	29.73±7.06	10.68±4.04	8.800±1.115
3. EDSS 2.0-3.0	30.83±5.25	28.02±6.22	10.80±4.26	8.507±1.130
4. EDSS 3.5-4.5	31.97±5.05	31.62±6.68	10.98±3.95	9.277±0.997
5. EDSS 5.0-6.5	28.88±6.98	29.66±9.59	9.508±3.831	8.375±0.998
p1-2	<0.001	<0.01	>0.05	<0.001
p1-3	<0.01	>0.05	>0.05	<0.05
p1-4	<0.001	<0.001	>0.05	<0.001
p1-5	>0.05	>0.05	>0.05	>0.05
p3-4	>0.05	<0.05	>0.05	<0.05
p3-5	>0.05	>0.05	>0.05	>0.05
p4-5	>0.05	>0.05	>0.05	<0.05

When analyzing gender differences in body mass component composition indicators among patients with multiple sclerosis, it was found (see Table 2): in patients of the general group and in patients with mild and moderately severe disorders, men had significantly ($p < 0.05$ – 0.001) higher values of the muscle component of body mass according to Matiegka (by 22.60 % – 25.84 % – 31.22 %, respectively), according to the American Institute of Nutrition (by 30.80 % – 36.04 % – 42.70 %, respectively) and the bone component of body mass according to Matiegka (by 23.81 % – 26.15 % – 36.17 %, respectively) compared to similar indicators in the corresponding groups of female patients.

The study revealed statistically significant differences in body composition and somatotypes among Ukrainian men and women with MS, which is consistent with the results of previous studies indicating the role of obesity and related metabolic factors in the pathogenesis and course of MS. A number of recent studies have shown that increased body weight, especially in adolescence, significantly increases the risk of developing the disease in the future. Obesity is associated with an increased risk of MS ($\beta = 0.38$; 95 % CI: 0.28–0.48; $p < 0.001$), with leptin and vitamin D deficiency partially mediating this relationship [2].

Particular attention in the literature is paid to the relationship between obesity and the clinical course of MS. Thus, Lutfullin I. et al. [7] in a prospective cohort study of over 1000 patients, patients with an elevated body mass index ($BMI > 30 \text{ kg/m}^2$) had a 1.64 (95 % CI: 1.12–2.39; $p = 0.01$) risk of clinically significant deterioration compared with patients with normal BMI. Similar results were obtained by other authors, who showed that obesity not only affects the frequency of relapses, but also accelerates the progression of disability, especially in female patients [10]. Leptin, a key hormone associated with obesity, has a pronounced pro-inflammatory effect in the CNS, potentiating the activation of Th1/Th17 lymphocytes, which play a central role in the pathogenesis of MS [8]. In obese patients, leptin levels were significantly elevated compared with controls (mean: $30.2 \pm 5.4 \text{ ng/mL}$ vs. $12.7 \pm 4.9 \text{ ng/mL}$; $p < 0.001$),

which correlated with MRI disease activity and clinical parameters. In turn, other adipokines, in particular adiponectin, have a protective effect, and their deficiency may also be a risk factor [2, 8].

According to 18 studies, obesity in adolescence increases the risk of developing MS by 41 % in men and by 63 % in women (OR=1.63; 95 % CI: 1.40–1.89) [11]. At the same time, the authors emphasize that these relationships may be partially modified by other factors, such as physical activity level, hormonal status, or genetic predisposition.

It is also worth noting that obesity and altered body composition can exacerbate inflammatory processes in the brain. F. Palavra et al. [9] in their review described the mechanisms of interaction between metabolic dysfunction and neuroinflammation, emphasizing that chronic systemic inflammation induced by obesity contributes to the disruption of the barrier function of the blood-brain barrier, which facilitates the migration of immune cells to the CNS. Thus, the pathophysiological interaction between anthropometric characteristics and disease activity has not only a clinical but also a biological basis.

Separate studies also pay attention to the peculiarities of somatotypes in different populations of patients with MS. Among patients with severe MS (EDSS $\geq$ 6.0), the proportion of obese individuals was twice as high as among patients with minimal neurological deficit (48 % vs. 22 %; $p<0.01$), suggesting a potential link between increased fat mass and severity of the disease [10].

At the same time, the results of a large international study, EnvIMS, conducted in Italy and Norway, confirm the association between increased BMI in adolescence and an increased risk of MS in adulthood. According to this study, overweight women (BMI >25 kg/m² at the age of 15-19 years) had a 1.8-fold higher risk of developing MS than women with normal body weight (OR=1.80; 95 % CI: 1.30–2.48) [14].

Taken together, the data obtained confirm that changes in the component composition of body weight, in particular an increase in adipose tissue, as well as the characteristics of somatotypes, can not only be a risk factor for the occurrence of MS, but also modify its course.

Conclusions

1. Between practically healthy or multiple sclerosis patients, numerous reliable or trends in differences in the components of the Heath-Carter somatotype (higher values in the general group of sick women and patients with moderate disorders of the mesomorphic component of the somatotype and lower values of the ectomorphic component of the somatotype) and indicators of the component composition of body mass (higher values in the general group of sick men and groups with mild and moderately severe disorders of the muscle component of body mass according to Matiegka and according to the American Institute of Nutrition; as well as higher values in the general group of sick women and groups with mild and moderate disorders of the muscle component of body mass according to Matiegka, according to the American Institute of Nutrition and the bone component of body mass according to Matiegka) have been established.

2. Most of the significant or trends in the differences in the components of the Heath-Carter somatotype (except for endomorphic, higher values in the group of patients with moderate disorders) and indicators of the component composition of body mass (except for fat, lower values in the group of patients with moderate disorders) between patients with multiple sclerosis with mild, moderate and moderately severe disorders were found in men.

3. Pronounced manifestations of sexual dimorphism were found only for most indicators of the component composition of body mass (except for fat) between patients with multiple sclerosis, men (higher values in the general groups and in the groups of patients with mild and moderately severe disorders) and women.

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SURGICAL CORRECTION OF BLEPHAROPTOSIS IN THE ELDERLY PATIENTS

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The demographic trends of the planet are such that with an increase in life expectancy, the older population will almost double from 2005 to 2050. Ensuring a decent quality of life for older people is one of the main tasks of a developed social society. Against the background of the natural aging process of the body, changes in the form of involutional (senile) blepharoptosis and concomitant age-related changes in the periorbital region deserve attention. This study aimed to determine the optimal tactics of upper eyelid ptosis surgery from the perspective of a comprehensive assessment of concomitant age-related changes such as overhanging folds of the upper eyelid, fat packs of the lower eyelids, as well as lowering of the eyebrows to achieve a cosmetically acceptable result for the patient. The choice of blepharoptosis correction tactics should be considered from the standpoint of a one-time elimination of age-related changes, the correction of which can ensure both functional and cosmetic satisfaction of the patient.

Key words: blepharoptosis, patients over 50 years old, age-related cataract.

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ХІРУРГІЧНА КОРЕКЦІЯ БЛЕФАРОПТОЗУ У ПАЦІЄНТІВ ПОХИЛОГО ВІКУ

Демографічні тенденції планети такі, що зі збільшенням тривалості життя чисельність літнього населення з 2005 по 2050 рік майже подвоїться. Забезпечення гідної якості життя людей – одне з головних завдань розвиненого соціального суспільства. На тлі природного процесу старіння організму заслуговують на увагу зміни у вигляді інволюційного (старечого) блефароптозу та супутніх вікових змін у періорбітальній ділянці. Метою даного дослідження було визначення оптимальної тактики хірургічного лікування птозу верхньої повіки з точки зору комплексної оцінки супутніх вікових змін, таких як складки верхньої повіки, що нависають, жирові відкладення на нижніх повіках, а також опущення брів, для досягнення косметично прийняттого результату для пацієнта. Вибір тактики корекції блефароптозу слід розглядати з погляду одномоментного усунення вікових змін, корекція яких може забезпечити як функціональне, і косметичне задоволення пацієнта.

Ключові слова: блефароптоз, пацієнти віком від 50 років, вікова катаракта.

Against the background of demographic trends on the planet, with an expected increase in the elderly population almost twofold, changes in the visual organ and the auxiliary apparatus deserve attention [8].

Eyelid surgeries occupy the 1st position in the list of the most frequent plastic surgeries on the face, confirming the high frequency and demand for appendages surgeries [12].

Blepharoptosis (BP) leads to functional disorders, decreased central vision, forced lifting of the chin up, the need to tilt the head back due to blurred visual axis, wrinkling the forehead, accompanied by headaches, discomfort. The purpose of BP surgery is to raise the drooping eyelid, eliminate discomfort, complaints of the patient, improve the quality of life, and is a logical criterion for evaluating the outcome of treatment [10].

Surgical correction of BP is a widely discussed problem by both ophthalmologists and plastic surgeons, where the functional and cosmetic satisfaction of the patient undoubtedly remains the evaluation