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PECULIARITIES OF HEAD SIZE, TOTAL AND LONGITUDINAL BODY DIMENSIONS IN UKRAINIAN MEN AND WOMEN WITH MULTIPLE SCLEROSIS

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Annotation. Understanding the anthropometric characteristics of patients with multiple sclerosis is important for identifying potential links between somatotype and the course of the disease. The study of parameters such as head size, total and longitudinal body dimensions is important given the prevalence and severity of multiple sclerosis. This may improve the approach to the diagnosis, treatment and rehabilitation of patients with multiple sclerosis. The aim of the study is to establish the characteristics and gender differences in cephalometric indicators, total and longitudinal body dimensions in young Ukrainian men and women with multiple sclerosis. Cephalometric indicators, total and longitudinal body dimensions were determined in 35 Ukrainian men and 59 young women with multiple sclerosis with mild, moderate and moderately severe disorders. As a control group, similar anthropometric indicators of 82 practically healthy Ukrainian men and 101 young women were taken from the data bank of the National Pirogov Memorial Medical University, Vinnytsya Research Center. Statistical analysis was performed in the licensed statistical package "Statistica 6.0" using non-parametric evaluation methods. In all groups of sick men and women, smaller values of the greatest head width and sagittal arc and larger values of the greatest head length were established compared to practically healthy men or women. In sick men with mild and moderately severe disorders, as well as in sick women of the general group and moderate disorders, larger values of mass and body surface area were established compared to practically healthy men or women. In most groups of sick men and women, higher values of the height of the suprasternal, acromial and finger anthropometric points and lower values of the height of the pubic and acetabular anthropometric points were established compared to practically healthy men or women, which, against the background of the practical absence of body length differences between healthy and sick men or women, indicate a more elongated torso and shorter lower limbs (a manifestation of a "subpathological" constitutional type). Only single reliable or trends in the above body dimensions were established between sick men or women. Pronounced manifestations of sexual dimorphism were established for most cephalometric dimensions, total and longitudinal body dimensions between men with multiple sclerosis (larger values) and women.
Keywords: nervous diseases, multiple sclerosis, anthropometry, head size, total and longitudinal body dimensions, practically healthy and sick men and women, sexual differences.

Introduction

Multiple sclerosis (MS) is one of the most common causes of neurological disability in young people, affecting an estimated 2.8 million people worldwide [9, 20]. Its prevalence varies by geographic region and ranges from 5 to over 200 cases per 100,000 population, with the highest rates in Northern Europe, North America, and Australia [9]. Ukraine, as a country with a medium incidence rate, faces similar challenges in the diagnosis, treatment, and rehabilitation of patients with MS. The disease usually manifests between the ages of 20 and 40, most often affecting women, with a male-to-female ratio of approximately 1:3 [16, 20].

MS is characterized by autoimmune inflammation that leads to demyelination and axonal damage in the central nervous system. This damage is the result of a complex interaction of genetic and environmental factors. Genetic risks include variations in HLA loci, while external factors include Epstein-Barr virus infection, vitamin D deficiency, smoking, and obesity [16, 20]. The pathophysiology of MS involves immune damage to oligodendrocytes, which are responsible for the formation of the myelin sheath, which causes impaired transmission of nerve impulses, neurodegeneration, and ultimately progressive disability in patients [11, 16]. The clinical manifestations of MS are diverse and include motor, sensory, cognitive, and autonomic disorders that significantly affect the quality of life of patients. In particular, common symptoms include muscle weakness, spasticity, impaired coordination of movements, decreased sensitivity, pain, visual impairment, and others [16, 20]. Additionally, psychiatric disorders such as depression, anxiety, cognitive dysfunction, and even suicidal ideation are observed in a significant proportion of patients with MS. Depression affects up to 50 % of these patients, making it one of the most common comorbid conditions [12, 17]. According to studies, psychiatric disorders not only worsen the prognosis, but also make it difficult to adhere to treatment and significantly reduce the quality of life of patients [12, 15, 17].

The economic burden of MS is extremely high. In the United States, the average annual cost of treating one patient is more than $88,000, including direct costs for medication, hospitalization, and rehabilitation, as well as indirect costs associated with reduced work productivity and losses due to premature disability [2, 3, 5]. A systematic review shows that direct costs can account for up to 75% of total costs, with immunomodulatory therapies being the

most expensive [7]. In addition, patients with lower socioeconomic status are at higher risk of faster disease progression and poorer access to modern treatments [9].

Neurodegeneration, manifested by brain atrophy, is an important predictor of disability progression in patients with MS. A 10-year follow-up study showed that the degree of brain atrophy is closely correlated with the decline in physical and cognitive functions [11]. Given the impact of this process, as well as the significant impact of MS on patients quality of life, it is important to understand how physical and anthropometric parameters, such as head size, total and longitudinal body dimensions, may be associated with the course of the disease. This not only allows us to improve our understanding of the mechanisms of the disease, but also contributes to the development of personalized approaches to treatment and rehabilitation.

Given the social, economic, and medical significance of multiple sclerosis, the study of its manifestations and comorbid conditions is a relevant area of modern medicine. This disease requires an interdisciplinary approach that includes both the assessment of physical and mental aspects and economic analysis in order to increase the effectiveness of treatment and improve the quality of life of patients [9, 12, 20].

The purpose of the study is to establish the characteristics and sex differences in cephalometric indicators, total and longitudinal body dimensions in young Ukrainian men and women with multiple sclerosis.

Materials and methods

Anthropological examination was conducted on 35 Ukrainian men and 59 women of young age (25-44 years, according to the WHO age classification, 2015) diagnosed with multiple sclerosis. The study was carried out at the Department of Nervous Diseases of the National Pirogov Memorial Medical University, Vinnytsya, and the Salutem Medical Center (Vinnytsya). The examination followed the anthropometric schemes of V. V. Bunak, modified by P. P. Shaparenko [23]. The assessment included the determination of cephalometric parameters (head circumference OB_GL, maximum head width B_SH_GL, maximum head length B_DL_GL, sagittal arc SAG_DUG, face width SH_LICA, and mandibular width SH_N_CH), total body dimensions (body mass, body length, and body surface area), and longitudinal body dimensions (heights of the suprasternal ATND, pubic ATL, acromial ATPL, dactylion ATP, and trochanteric ATV anthropometric points). Committee on Bioethics of National Pirogov Memorial Medical University, Vinnytsya (protocol № 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 study was conducted at the National Pirogov Memorial Medical University, Vinnytsya "Constitutional features of body structure in people with multiple sclerosis and its impact on the course of the disease", state registration No. 0121U114309.

The diagnosis of multiple sclerosis was made according to the 2017 McDonald criteria [24]. The Expanded Disability Status Scale was used to assess the degree of disability. The group of patients with mild impairments (EDSS 2.0-3.0) included 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 a control group, the initial head dimensions and total and longitudinal body dimensions of 82 practically healthy Ukrainian men and 101 practically healthy Ukrainian women of a similar age group were taken from the data bank of the National Pirogov Memorial Medical University, Vinnytsya.

Statistical analysis of the obtained results was performed in the licensed statistical package "Statistica 6.0" using non-parametric evaluation methods. The averages for each trait under study and the standard square deviation were determined. The significance of the difference in values between independent quantitative values was determined using the Mann-Whitney U-test.

Results. Discussion

The results obtained by us for determining cephalometric indicators, total and longitudinal body dimensions in young Ukrainian men and women with multiple sclerosis with mild, moderate and moderately severe disorders are presented in Tables 1, 2 and 3.

Based on the analysis of differences in *cephalometric indicators* between practically healthy individuals and patients with multiple sclerosis, it was established (see Table 1): *both in men and women with multiple sclerosis overall, as well as in those with mild, moderate, and moderately severe impairments* significantly ($p<0.05$-0.001) smaller values of the greatest head breadth (in male patients by 12.10 % 12.29 % 11.78 % 11.52 %, and in female patients by 13.12 % 14.79 % 11.86 % 11.53 %) and sagittal arc (in male patients by 9.95 % 10.04 % 11.09 % 7.35 %, and in female patients by 12.08 % 11.32 % 12.98 % 11.82 %), as well as significantly ($p<0.05$-0.001) greater, or a pronounced tendency toward greater values ($p=0.057$) of the greatest head length (in male patients by 5.53 % 5.48 % 4.91 % 7.29 %, and in female patients by 6.59 % 7.74 % 5.93 % 4.94 %); *in male patients with multiple sclerosis*, significantly ($p<0.05$-0.01) greater values of face width (by 5.02 %) and mandible width (by 5.97 %) were observed in the general group, while in the group with mild impairments, significantly ($p<0.001$) greater face width (by 6.70 %) was noted, and in the group with moderately severe impairments, significantly ($p<0.001$) greater mandible width (by 12.36 %); *in female patients with multiple sclerosis*, in the group with moderately severe impairments, significantly ($p<0.05$) smaller head circumference (by 2.39 %) was observed, while in the

Table 1. Head dimensions (cm) in practically healthy and multiple sclerosis patients in Ukrainian men and women (M±σ).

Parameters and groups	Men					
	OB_GL	B_SH_GL	B_DL_GL	SAG_DUG	SH_LICA	SH_N_CH
1. Practically healthy	57.86±1.54***	15.54±0.95***	19.34±0.75***	31.57±1.69***	12.54±0.91***	9.701±1.314
2. Patients in general	57.68±1.86***	13.66±1.27*	20.41±0.83***	28.43±1.04***	13.17±1.03***	10.28±0.81***
3. Patients with EDSS 2.0-3.0	57.55±1.82***	13.63±1.19*	20.40±0.74***	28.40±1.00***	13.38±0.85***	10.23±0.85***
4. Patients with EDSS 3.5-4.5	57.36±1.55**	13.71±1.89	20.29±0.76*	28.07±0.73**	12.33±1.20	10.11±0.75ttt
5. Patients with EDSS 5.0-6.5	59.00±2.48*	13.75±0.50	20.75±1.50ttt	29.25±1.50*	13.35±1.25	10.90±0.52**
p1-2	0.7321	**0.0000**	**0.0000**	**0.0000**	**0.0018**	**0.0436**
p1-3	0.5894	**0.0000**	**0.0000**	**0.0000**	**0.0002**	0.1718
p1-4	0.4880	**0.0032**	**0.0078**	**0.0000**	0.6475	0.4105
p1-5	0.2224	**0.0018**	***0.0565***	**0.0199**	0.1894	**0.0330**
p3-4	0.9247	0.9060	0.7231	0.3821	**0.0399**	0.7768
p3-5	0.1892	0.9738	0.5546	0.3411	0.8439	0.1310
p4-5	0.1809	1.0000	0.5708	0.1859	0.3447	0.1082
Parameters and groups	Women					
	OB_GL	B_SH_GL	B_DL_GL	SAG_DUG	SH_LICA	SH_N_CH
1. Practically healthy	55.66±1.27	15.01±0.92	18.21±0.99	30.12±1.61	12.06±0.89	9.475±1.281
2. Patients in general	55.19±1.56	13.04±1.79	19.41±0.72	26.48±1.43	12.21±1.33	9.263±0.718
3. Patients with EDSS 2.0-3.0	55.55±1.23	12.79±1.47	19.62±0.57	26.71±1.46	12.17±1.30	9.142±0.567
4. Patients with EDSS 3.5-4.5	55.13±1.64	13.23±2.19	19.29±0.86	26.21±1.18	12.35±1.43	9.413±0.858
5. Patients with EDSS 5.0-6.5	54.33±1.98	13.28±1.50	19.11±0.60	26.56±1.94	11.92±1.25	9.211±0.708
p1-2	0.1582	**0.0000**	**0.0000**	**0.0000**	0.1197	***0.0876***
p1-3	0.9025	**0.0000**	**0.0000**	**0.0000**	0.2903	***0.0563***
p1-4	0.2157	**0.0000**	**0.0000**	**0.0000**	***0.0961***	0.6073
p1-5	**0.0484**	**0.0007**	0.0041	**0.0000**	0.9782	0.3741
p3-4	0.3983	0.3983	0.2140	0.1453	0.3983	0.1299
p3-5	***0.0859***	0.3454	***0.0701***	0.8062	0.6371	0.9248
p4-5	0.2933	0.7772	0.4669	0.7160	0.3422	0.4188

Notes: in this and the following tables, p – significance of differences in indicators between the corresponding groups of men or women; *, **, *** – significant differences (respectively <0.05, <0.01 or <0.001) of indicators between the corresponding groups of men and women (higher values are indicated); ttt, tt, t – trends of differences (respectively from 0.061 to 0.070, from 0.071 to 0.080 or from 0.081 to 0.099) of indicators between the corresponding groups of men and women (higher values are indicated).

general group, there was a slight tendency (p=0.088) toward smaller mandible width (by 2.24 %); in the group with mild impairments, there was a pronounced tendency (p=0.056) toward smaller mandible width (by 3.51 %), and in the group with moderate impairments, there was a slight tendency (p=0.096) toward greater face width (by 2.40 %).

When analyzing the differences in *cephalometric indicators* among male or female patients with multiple sclerosis, almost no significant differences or tendencies were identified (see Table 1): only in male patients with mild impairments was the face width 7.85 % (p<0.05) greater compared to male patients with moderate impairments; in female patients with mild impairments, the head circumference was 2.20 % (p=0.086) and the greatest head length 2.60 % (p=0.070) smaller compared to female patients with moderately severe impairments.

When analyzing sex differences in *cephalometric indicators* among patients with multiple sclerosis, it was established (see Table 1): all cephalometric dimensions in male patients in the general group and with mild impairments were significantly (p<0.05-0.001) larger compared to the respective groups of female patients (ranging from 4.32 % to 9.89 % in the general group and from 3.48 % to 10.64 % in patients with mild impairments); in male patients with moderate and moderately severe impairments, significantly larger (p<0.05-0.01) or tendencies toward larger values (p=0.064-0.065) of head circumference (by 3.89 % and 7.92 %, respectively),

Table 2. Total body dimensions in practically healthy and multiple sclerosis patients of Ukrainian men and women (M±σ).

Parameters and groups	Men		
	body length (cm)	body weight (kg)	surface area (m^2)
1. Practically healt	177.2±6.5***	73.68±10.40***	1.903±0.148***
2. Patients in general	179.2±5.8***	78.67±16.75***	1.977±0.203***
3. Patients with EDSS 2.0-3.0	179.2±5.9***	81.54±15.92***	1.998±0.187***
4. Patients with EDSS 3.5-4.5	178.2±6.3***	67.86±18.58	1.838±0.247
5. Patients with EDSS 5.0-6.5	181.1±5.0*	89.25±12.04*	2.097±0.102**
p1-2	***0.0746***	0.1682	***0.0685***
p1-3	0.1112	**0.0327**	**0.0314**
p1-4	0.7489	0.1183	0.1353
p1-5	0.1663	**0.0169**	**0.0147**
p3-4	0.5708	**0.0447**	***0.0527***
p3-5	0.4702	0.3089	0.3411
p4-5	0.2986	**0.0472**	***0.0588***
Parameters and groups	Women		
	body length (cm)	body weight (kg)	surface area (m^2)
1. Practically healthy	164.9±6.1	58.35±8.22	1.635±0.121
2. Patients in general	164.8±5.9	62.95±12.27	1.685±0.154
3. Patients with EDSS 2.0-3.0	165.1±4.8	63.31±13.38	1.691±0.161
4. Patients with EDSS 3.5-4.5	164.2±6.1	65.48±13.19	1.694±0.142
5. Patients with EDSS 5.0-6.5	165.8±8.7	59.12±12.89	1.647±0.177
p1-2	0.7745	***0.0550***	***0.0518***
p1-3	0.7088	0.2677	0.2613
p1-4	0.7924	**0.0139**	**0.0360**
p1-5	0.5094	0.8316	0.7643
p3-4	0.6343	0.4316	0.6001
p3-5	0.8208	0.3454	0.7059
p4-5	0.7010	0.3422	0.5715

Table 3. Longitudinal body dimensions (cm) in practically healthy and multiple sclerosis patients Ukrainian men and wome (M±σ).

Parameters and groups	Men				
	ATND	ATL	ATPL	ATP	ATV
1. Practically healthy	143.8±6.1***	90.57±5.04***	146.9±7.1***	65.85±4.95***	94.04±5.40***
2. Patients in general	148.2±5.0***	83.99±4.26t	150.8±5.0***	70.93±3.93***	90.29±4.85**
3. Patients with EDSS 2.0-3.0	148.3±5.2***	84.19±4.70	84.19±4.70	70.90±3.73**	89.52±4.10tt
4. Patients with EDSS 3.5-4.5	146.9±4.9***	83.71±3.15	149.1±4.9***	69.71±3.35ttt	91.93±7.23ttt
5. Patients with EDSS 5.0-6.5	150.0±4.2*	83.25±3.95	154.5±4.0**	73.25±5.91	92.00±4.32
p1-2	**0.0001**	**0.0000**	**0.0007**	**0.0000**	**0.0002**
p1-3	**0.0007**	**0.0000**	**0.0035**	**0.0000**	**0.0002**
p1-4	0.1414	**0.0006**	0.2930	**0.0310**	0.1498
p1-5	**0.0384**	**0.0084**	**0.0205**	**0.0184**	0.4986
p3-4	0.3694	0.9812	0.2986	0.5236	0.6536
p3-5	0.4906	0.7929	***0.0941***	0.4118	0.2787
p4-5	0.2568	0.9247	***0.0890***	0.3447	0.7055
Parameters and groups	Women				
	ATND	ATL	ATPL	ATP	ATV
1. Practically healthy	133.8±5.9	85.28±5.48	136.5±5.7	62.89±4.19	88.86±5.91
2. Patients in general	136.7±5.8	82.03±4.64	138.8±6.0	67.36±4.11	86.78±4.78
3. Patients with EDSS 2.0-3.0	136.9±4.7	82.71±3.73	138.8±4.8	67.27±3.15	87.38±4.43
4. Patients with EDSS 3.5-4.5	136.0±6.0	81.00±4.75	138.1±6.3	66.63±3.90	86.01±4.43
5. Patients with EDSS 5.0-6.5	138.2±8.3	82.78±6.49	140.4±8.5	69.61±6.36	87.11±6.72
p1-2	**0.0013**	**0.0001**	**0.0068**	**0.0000**	**0.0048**
p1-3	**0.0060**	**0.0042**	**0.0211**	**0.0000**	***0.0760***
p1-4	0.1086	**0.0004**	0.1945	**0.0000**	**0.0080**
p1-5	**0.0373**	0.4323	***0.0607***	**0.0061**	0.3980
p3-4	0.6763	0.3126	0.7932	0.4606	0.2944
p3-5	0.2906	0.7916	0.3264	0.2130	0.9398
p4-5	0.2331	0.3220	0.3525	0.1757	0.7010

greatest head length (by 4.93 % and 7.90 %, respectively), sagittal arc (by 6.63 % and 9.20 %, respectively), and mandible width (by 6.89 % and 15.50 %, respectively) were observed compared to the respective groups of female patients.

As a result of the analysis of differences in *total body sizes* between practically healthy individuals and male or female patients with multiple sclerosis, the following was established (see Table 2): *among male patients with multiple sclerosis* in the general group, tendencies ($p<0.069-0.075$) toward higher values of body length (by 1.13 %) and body surface area (by 3.89 %) were identified; in the group of patients with mild and moderately severe impairments, significantly higher values ($p<0.05$ in all cases) of body mass (by 10.67 % and 21.13 %, respectively) and body surface area (by 4.99 % and 10.19 %, respectively) were observed; *among female patients with multiple sclerosis* in the general group and in the group with moderate impairments, significantly higher values ($p<0.05$) or strong tendencies toward higher values ($p=0.052-0.055$) of body mass (by 7.88 % and 12.22 %, respectively) and body surface area (by 3.06 % and 3.61 %, respectively) were established.

When analyzing differences in *total body sizes* among male or female patients with multiple sclerosis (see Table 2), only in male patients with moderate impairments were

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significantly lower values (p<0.05) or tendencies toward lower values (p=0.052-0.055) of body mass (by 16.78 % and 23.97 %, respectively) and body surface area (by 8.01 % and 12.35 %, respectively) observed compared to male patients with mild and moderately severe impairments.

When analyzing sex differences in *total body sizes* among patients with multiple sclerosis, the following was established (see Table 2): all total sizes in male patients in the general group, with mild impairments, and with moderately severe impairments were significantly larger (p<0.05-0.001) compared to the corresponding groups of female patients (ranging from 8.04 % to 19.98 % in the general group, from 7.87 % to 22.36 % in patients with mild impairments, and from 8.45 % to 33.76 % in patients with moderately severe impairments); in male patients with moderate impairments, only body length was significantly (p<0.001) greater (by 7.86 %).

As a result of analyzing differences in *longitudinal body dimensions* between practically healthy individuals and male or female patients with multiple sclerosis, the following was found (see Table 3): *in both male and female patients with multiple sclerosis overall and in those with mild impairments*, significantly higher values (p<0.05-0.001) or tendencies toward higher values (p=0.076) were observed for the suprasternal height (in male patients by 3.06 % and 3.13 %, in female patients by 2.17 % and 2.32 %), acromial height (in male patients by 2.65 % and 2.52 %, in female patients by 1.68 % and 1.68 %), and finger anthropometric points (in male patients by 7.71 % and 7.67 %, in female patients by 7.11 % and 6.96 %). Additionally, significantly lower values (p<0.01-0.001) or tendencies toward lower values (p=0.076) of the pubic height (in male patients by 7.33 % and 7.04 %, in female patients by 3.81 % and 3.01 %) and trochanteric height (in male patients by 3.99 % and 4.81 %, in female patients by 2.34 % and 1.67 %) were recorded. *Among male patients with multiple sclerosis* in the group with moderate and moderately severe impairments, significantly lower values (p<0.01-0.001) of the pubic anthropometric point (by 7.57 % and 8.08 %, respectively) and significantly higher values (p<0.05 in both cases) of the finger anthropometric point (by 5.86 % and 11.24 %, respectively) were observed, as well as significantly higher values (p<0.05 in both cases) of the suprasternal (by 4.31 %) and acromial (by на 5.17 %) anthropometric points in the group with moderately severe impairments. *Among female patients with multiple sclerosis* in the group with moderate impairments, significantly lower values (p<0.01-0.001) of the pubic (by 5.02 %) and trochanteric (by 3.21 %) anthropometric points and significantly higher values (p<0.001) of the finger anthropometric point (by 5.95 %) were recorded. In the group with moderately severe impairments, significantly higher values (p<0.05-0.01) or tendencies toward higher values (p=0.061) of the suprasternal (by 3.29 %), acromial (by 2.86 %), and finger (by 10.69 %) anthropometric points were noted.

The identified differences in longitudinal body dimensions, specifically higher values of the suprasternal, acromial, and finger anthropometric points and lower values of the pubic and trochanteric anthropometric points in Ukrainian male and female patients with multiple sclerosis compared to practically healthy individuals, against the backdrop of an almost complete absence of differences in body length between healthy and affected individuals, indicate a more elongated torso and shorter lower limbs, which is a manifestation of a “subpathological” constitutional type.

When analyzing differences in *longitudinal body dimensions* among male or female patients with multiple sclerosis (see Table 3), only male patients with moderately severe impairments showed slight tendencies toward higher values (p=0.089-0.094) of the acromial anthropometric point (by 2.59 % and 3.62 %, respectively) compared to male patients with mild and moderate impairments.

When analyzing sex differences in *longitudinal body dimensions* among patients with multiple sclerosis, the following was observed (see Table 3): all longitudinal dimensions in male patients in the general group were significantly larger (p<0.01-0.001) or showed tendencies toward higher values (p=0.095) compared to the respective groups of female patients (ranging from 2.33 % to 7.96 %). In male patients with mild and moderate impairments, significantly higher values (p<0.01-0.001) or tendencies toward higher values (p=0.069-0.071) were noted for the suprasternal (by 7.69 % and 7.42 %, respectively), acromial (by 7.84 % and 7.38 %, respectively), finger (by 5.12 % and 4.42 %, respectively), and trochanteric (by 2.39 %% and 6.44 %, respectively) anthropometric points compared to the corresponding groups of female patients. In male patients with moderately severe impairments, significantly higher values (p<0.001 in both cases) of the suprasternal (by 7.87 %) and acromial (by 9.13 %) anthropometric points were observed compared to the corresponding group of female patients.

The results of our study, which aimed to study the anthropometric characteristics of men and women with multiple sclerosis, are part of a broader scientific paradigm that analyzes the relationship between anthropometric indicators and the risk of developing or progressing neurological diseases. A significant number of studies confirm the importance of body mass index (BMI), obesity and other body parameters in the context of neurological disorders [21].

In the context of MS, obesity and increased BMI are considered as potential risk factors for the development of the disease. For example, a study by Gianfrancesco M. A. and Barcellos L. F. [8] shows that childhood obesity increases the risk of developing MS in adulthood. Among the possible mechanisms explaining this phenomenon are chronic inflammation associated with obesity, as well as immune system dysfunction. Mendelian Randomization

analysis confirms that increased BMI has a causal relationship with the risk of developing MS [18]. Additionally, Jacobs B. M. et al. [10] suggest that low vitamin D levels, often associated with excess body weight, may be an important modifier of this risk.

BMI dynamics also influence the progression of MS. It has been shown that women with MS who have a high BMI have a faster disease progression than men [4]. This supports the importance of considering gender in studies. Similarly, Paz-Ballesteros W. C. et al. [21] found that obesity, together with other factors (e.g. smoking), is associated with an increased risk of disability progression in patients with MS.

Studies of other neurological disorders also demonstrate the importance of anthropometric parameters. In particular, studies on Parkinson's disease indicate the influence of changes in BMI on the course of the disease. Mendelian Randomization suggests that low BMI may reduce the risk of developing Parkinson's disease [19], while Wills A. M. A. et al. [25] found that a decrease in BMI in patients with this pathology correlated with a worsening of their condition. These results emphasize the relationship between body mass and survival of such patients.

Similar observations have been made for spinocerebellar ataxias. Diallo A. et al. [6] found that a decrease in BMI was associated with disease progression. Similar results were reported by Yang J. S. et al. [26], who studied spinocerebellar ataxia type 3 and found that a low BMI correlated with a more severe course of the disease ($r=-0.58$; $p<0.05$).

In addition to BMI, other aspects of body composition are also important. For example, a study of patients with ataxia telangiectasia found that a decrease in muscle mass and strength are key factors influencing the severity of the disease [22].

Obesity has also been associated with an increased risk of Alzheimer's disease. S. Alford et al. [1] have suggested that obesity in midlife increases the risk of Alzheimer's disease, likely through increased systemic inflammation and insulin resistance. L. Letra et al. [14] have highlighted the role of adipokines, such as leptin and adiponectin, in neuroinflammation and may be key links in the relationship between obesity and cognitive impairment.

In addition, anthropometric parameters are associated with the risk of other neurological disorders, such as epilepsy. Obesity has been shown to increase the risk of generalized epilepsy, especially in patients with a family history of the disease, suggesting a genetic basis for this association [13].

Thus, the results of the study are part of a broader context that suggests that anthropometric parameters are not only a reflection of the patient's physical condition, but can also play an important role in the pathogenesis and course of neurological diseases. The study of these relationships is a promising direction for improving diagnostic methods, prognosis and personalized treatment.

Conclusion and prospects for further developments

1. Numerous significant differences or trends have been established in cephalometric dimensions, total body dimensions, and longitudinal body dimensions between practically healthy individuals and patients with multiple sclerosis, both male and female. Across all groups of male and female patients, smaller values for maximum head width and sagittal arc and larger values for maximum head length were observed. In half of the groups of male and female patients, higher values for body mass and body surface area were recorded. Additionally, in most groups of male and female patients, greater heights of the suprasternal, acromial, and dactylion anthropometric points were noted, alongside lower heights of the pubic and trochanteric anthropometric points. The differences in longitudinal body dimensions, coupled with the near absence of differences in body length between healthy and diseased individuals, suggest a more elongated trunk and relatively shorter lower limbs, indicative of a "subpathological" constitutional type.

2. Among male and female patients with multiple sclerosis presenting with mild, moderate, or moderately severe impairments, only isolated significant differences or trends in cephalometric dimensions were identified. Furthermore, such differences in total and longitudinal body dimensions were observed exclusively among male patients.

3. Pronounced manifestations of sexual dimorphism were identified for most cephalometric dimensions, total body dimensions, and longitudinal body dimensions between male and female patients with multiple sclerosis, with male patients exhibiting larger values. These patterns were consistent across the overall patient groups as well as within subgroups of patients with mild, moderate, and moderately severe impairments.

Future research is planned to explore the characteristics and sex-based differences in other anthropometric parameters among young Ukrainian men and women with multiple sclerosis.

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ОСОБЛИВОСТІ РОЗМІРІВ ГОЛОВИ ТА ТОТАЛЬНИХ І ПОЗДОВЖНІХ РОЗМІРІВ ТІЛА В УКРАЇНСЬКИХ ЧОЛОВІКІВ І ЖІНОК ХВОРИХ НА МНОЖИННИЙ СКЛЕРОЗ

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Анотація. *Розуміння антропометричних особливостей хворих на множинний склероз є важливим для виявлення потенційних звязків між соматотипом і перебігом захворювання. Дослідження таких параметрів, як розміри голови, тотальні та поздовжні розміри тіла, є важливим з огляду на поширеність і тяжкість множинного склерозу. Це може покращити підхід до діагностики, лікування та реабілітації хворих на множинний склероз. Мета дослідження встановлення особливостей і статевих розбіжностей кефалометричних показників, тотальних і поздовжніх розмірів тіла в українських чоловіків і жінок молодого віку хворих на множинний склероз. У 35 українських чоловіків і 59 жінок молодого віку хворих на множинний склероз із легкими, помірними та помірно-тяжкими порушеннями проведено визначення кефалометричних показників, тотальних і*

поздовжніх розмірів тіла. В якості контрольної групи з банку даних науково-дослідного центру Вінницького національного медичного університету ім. М. І. Пирогова були взяті аналогічні антропометричні показники 82 практично здорових українських чоловіків і 101 жінки молодого віку. Статистичний аналіз проведений у ліцензійному статистичному пакеті "Statistica 6.0" з використанням непараметричних методів оцінки. В усіх групах хворих чоловіків і жінок встановлені менші значення найбільшої ширини голови і сагітальної дуги та більші значення найбільшої довжини голови порівняно з практично здоровими чоловіками або жінками. У хворих чоловіків із легкими та помірно-тяжкими порушеннями, а також у хворих жінок загальної групи та помірними порушеннями встановлені більші значення маси та площі поверхні тіла порівняно з практично здоровими чоловіками або жінками. В більшості груп хворих чоловіків і жінок встановлені більші значення висоти надгрудинної, акроміальної та пальцевої антропометричних точок і менші значення висоти лобкової та вертлюгової антропометричних точок порівняно з практично здоровими чоловіками або жінками, що на фоні практичної відсутності між здоровими та хворими чоловіками або жінками довжини тіла, вказують на більш видовжений тулуб і більш короткі нижні кінцівки (прояв "субпатологічного" конституціонального типу). Між хворими чоловіками або жінками встановлені лише поодинокі достовірні або тенденції відмінностей вище наведених розмірів тіла. Встановлені виражені прояви статевого диморфізму для більшості кефалометричних розмірів, тотальних і поздовжніх розмірів тіла між хворими на множинний склероз чоловіками (більші значення) та жінками.

Ключові слова: *нервові захворювання, множинний склероз, антропометрія, розміри голови, тотальні та поздовжні розміри тіла, практично здорови та хворі чоловіки й жінки, статеві розбіжності.*