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SOMATOTYPOLOGICAL PARAMETERS OF THE BODY IN MEN WITH BENIGN NEVI

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The study analyzed the features of the components and type of somatotype according to Heath Carter and indicators of the component composition of body weight in Ukrainian men with benign nevi. In most cases, practically healthy men have significantly lower values of the mesomorphic component of the somatotype and the muscular component of body weight and higher values of the ectomorphic component of the somatotype. Patients with melanocyte benign simple nevi have significantly higher values of somatotypological indicators (except for the ectomorphic component of somatotype) and indicators of the component composition of body weight than patients with melanocyte benign dysplastic nevi.

Key words: benign nevi, somatotype according to the method of Heath Carter, indicators of the component composition of body weight, Ukrainian men.

Н.Б. Ю. Хаддад, Л.Р. Матешук-Вацеба, О.Є. Маєвський, О.О. Коцюра, А.А. Наліжитий ОСОБЛИВОСТІ СОМАТОТИПОЛОГІЧНИХ ПАРАМЕТРІВ ТІЛА У ЧОЛОВІКІВ ІЗ ДОБРОЯКІСНИМИ НЕВУСАМИ

У ході дослідження проаналізовані особливості компонентів і типу соматотипу за Хіт-Картером і показників компонентного складу маси тіла в українських чоловіків хворих на доброякісні невуси. У більшості випадків у практично здорових чоловіків, порівняно з хворими, встановлені достовірно менші значення мезоморфного компоненту соматотипу і м'язового компоненту маси тіла та більші значення ектоморфного компоненту соматотипу. У хворих на меланоцитарні доброякісні прості невуси чоловіків встановлені достовірно більші значення соматотипу. У хворих на меланоцитарні доброякісні прості невуси чоловіків встановлені достовірно більші значення соматотипологічних показників (за винятком ектоморфного компоненту соматотипу) та показників компонентного складу маси тіла, ніж у хворих меланоцитарні доброякісні диспластичні невуси.

Ключові слова: доброякісні невуси, соматотип за методикою Хіт-Картер, показники компонентного складу маси тіла, українськи чоловіки.

The study was conducted at the National Pirogov Memorial Medical University, Vinnytsya "Constitutional aspects of the origin and features of benign nevi", state registration No. 0121U113154.

Nevogenesis is a complex process that involves the work of mechanisms of both endogenous and exogenous nature [1]. According to modern ideas, the formation of nevi, benign neoplasms of the skin containing melanocytes, can be divided into four successive stages: initiation, stimulation, aging and involution [11].

The first stage begins with the activation of the mutated cell, which activates the subsequent proliferation. Among such mutations, NRAS and BRAF play a key role [11]. Of the external factors that may be the trigger in the occurrence of these mutations, first of all consider the effects of solar radiation. Thus, a survey of 443 children revealed a link between childhood sunburn and subsequent nevi, especially in people with sensitive skin – such children are expected to have more nevi, regardless of the number of sunburns [13].

In 75 % of children aged 11–14 years, the formation of nevi is observed. At the same time in this age at 28 %, disappearance of nevi is noted. In 16 %, new nevi can appear at the age of 45. Thus, nevogenesis is a dynamic process that lasts a lifetime and involves the simultaneous course of all four stages of the evolution of nevi [12].

A survey of a cohort of veterans in the United States from 1991 to 2013 revealed 204 people with blue nevi (194 men). The mean age of the subjects was 62.8 years, and the duration of the disease in 90.3 % of patients was about 10 years. In 18 cases, a biopsy allowed to diagnose primary melanoma [5].

NRAS, BRAF and other mutations that accompany the process of nevus formation are components of the mitogenic pathway RAS-RAF-MEK-ERK, which is responsible for activating cell proliferation and, importantly, is also involved in melanoma [11].

The degeneration of benign nevi into malignant tumors, including melanoma, is one of the reasons for the increased interest of scientists in the study of nevi and their number in order to predict the risk of this process. A study of 566 patients over 3 years found that the presence of more than 50 nevi was

associated with a reduced chance of developing melanoma, while the presence of more than 5 atypical nevi was associated with an increased risk of melanoma [7].

Another component that definitely affects the occurrence of nevi is the ethnicity of the person. Thus, nevi and other pigmented neoplasms are more common in Caucasian children (83 %), while dermal melanocytosis is more common in Asians, African Americans, Native Americans, and Latinos [8].

Acral melanocyte nevi are also heterogeneous in different populations. In the sample of respondents, they were found in 36 % of people, among whom the most common were non-Caucasians, in particular, blacks and Latinos (p<0.01) [9]. In addition, there is a heterogeneous prevalence of this type of nevus among men and women (with a predominance of lesions among women) and different prevalence in different age groups. Thus, the highest prevalence is observed in people aged 20–40 years [14].

The influence of the ethnic component on the frequency of nevi confirmed in the publications of other researchers [13], which leads us to the fact that the anthropological component is one of the variables that actively influences the occurrence of different types of nevi.

The study of the influence of different components of the human somatotype on the occurrence and course of diseases, including cancer [10, 15] takes place in different countries. The success of the results of these studies allows us to judge the prospects of research to study the flow of various anthropometric indicators on the risk of nevi.

The purpose of the study was to establish the features of somatotypological indicators and indicators of the component composition of body weight in Ukrainian men of the first mature age with benign nevi.

Materials and methods. Ukrainian men with benign nevi – 34 with melanocyte benign simple nevi (MBSN), 27 with melanocyte benign dysplastic nevi (MBDN), 14 with melanocyte benign congenital nevi (MBCN) and 17 with non-melanocyte benign clinical nevi (NMBN), histopathological examinations on the basis of the Military Medical Clinical Center of the Central Region and the Department of Skin and Venereal Diseases with a course of postgraduate education of National Pirogov Memorial Medical University, Vinnytsya have done.

Committee on Bioethics of National Pirogov Memorial Medical University, Vinnytsya (protocol N_{2} 10 from 26.11.2020) 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.

Diagnosis of nevi was performed according to a two-step algorithm for the classification of pigmented tumors, which was adopted at the First World Congress of Dermatoscopy (Rome, 2001).

All patients were determined components (FX – endomorphic component of somatotype; MX – mesomorphic component of somatotype; LX – ectomorphic component of somatotype) and type of somatotype according to the Heath Carter scheme, as well as indicators of component composition of body weight by Matiegka formulas (MM – muscle component Matiegka body weight, OM – Matiegka bone mass component; DM – Matiegka body fat component) and muscle component of body weight according to the method of the American Institute of Nutrition (AIN) (MA – muscle component of body weight according to AIN) [2].

As a control from the data bank of the research center of National Pirogov Memorial Medical University, Vinnytsya selected somatotypological indicators and indicators of the component composition of body weight of 82 practically healthy Ukrainian men of the same age group (from 22 to 35 years).

Statistical processing of the results was performed in the license package "Statistica 5.5" using nonparametric evaluation methods. The significance of the difference between the values between the independent quantitative values was determined using the U-Mann-Whitney test, and between the percentage values using the Weber formula:

 $t = (P_1 - P_2) / \sqrt{[((N_1P_1 + N_2P_2) / (N_1 + N_2)) \times ((100 - (N_1P_1 + N_2P_2) / (N_1 + N_2)) \times ((N_1 + N_2) / (N_1N_2))]}$

where P_1 and P_2 – the percentage of meeting the corresponding sign;

 $N_1 \mbox{ and } N_2 - \mbox{ the number of observations in the groups studied.}$

Results of the study and their discussion. The study of anthropometric and somatotypological components in order to determine various standards and indices, age dynamics, sex and constitutional features of organ structure, as well as the course of processes in both normal and pathological conditions is an important step in any anthropological study. In addition, the use of anthropo-somatotypological methods allows one to study the biological characteristics of the organism of the subject, to assess and predict the peculiarities of many multifactorial diseases and purposefully form their risk groups.

The differences between the components of the somatotype according to Heath Carter, as well as indicators of the component composition of body weight according to Matiegka and AIN between practically healthy and benign nevi Ukrainian men, or between benign nevi men are presented in Table 1.

Table 1

| Indices | Healthy | Patients with benign nevi | | | | |
|---------|-------------|---------------------------|--------------------|--------------------|-------------------|--|
| | | MBSN | MBDN | MBCN | NMBN | |
| FX | 3.230±1.046 | 3.786±1.189 * ■ | 3.012±0.973 | 3.335±1.017 | 3.307±0.717 | |
| MX | 4.689±1.332 | 5.837±1.492 *■ | 4.837±1.590 | 5.314±1.678 | 5.419±1.541 t | |
| LX | 2.512±1.253 | 1.496±1.326 * | 2.320±1.587 ■ ° | 1.835±1.234 t | 1.467±1.103 * | |
| MM | 34.22±5.88 | 42.30±6.93 * ■ | 38.35±5.62 * | 40.52±7.34 * | 41.08±5.67 * | |
| MA | 38.67±7.20 | 47.37±10.64 *■ | 42.44±8.98 t | 49.03±10.17 * ● | 46.58±7.40 ∗ ₀ | |
| ОМ | 11.01±1.30 | 11.61±1.41 *■ | 10.84±1.31 | 11.25±1.10 | 11.27±1.30 | |
| DM | 10.96±3.50 | 10.45±2.97 ■ | 8.653±2.282 * | 10.19±2.63 | 10.09±2.35 o | |

Comparison of somatotype components and indicators of body weight component composition between healthy and benign nevi men $(M\pm\sigma)$

Notes: in this and the following tables, * – significant differences between healthy and patients with benign nevi; t – trends in differences between healthy and patients with benign nevi; \bullet – significant differences between patients with MBSN and other groups of patients with benign nevi (higher values); \bullet – significant differences between MBDN patients and MBCN or NMBN patients (higher values noted); \circ – trends in differences between MBDN patients and MBCN or NMBN patients (higher values observed).

In the analysis of the components of the somatotype and indicators of the component composition of body weight *between healthy and patients with benign nevi* men found:

– the endomorphic and mesomorphic components of the somatotype in healthy men are significantly smaller (p<0.05-0.001) than in patients with melanocyte benign simple nevi (14.7 % and 19.7 %, respectively), and only the mesomorphic component of the somatotype has a slight tendency to lower values (p=0.088) than in patients with non-melanocyte benign nevi (by 13.5 %);

- the ectomorphic component of the somatotype in healthy men is significantly higher (p<0.01-0.001) than in patients with melanocyte benign simple and non-melanocyte benign nevi (40.4 % and 41.6 %, respectively), and also has a slight tendency to higher values (p=0.091) than in patients with melanocyte benign congenital nevi (by 27.0 %);

– the muscle component of body weight according to Matiegka or AIN in healthy men is significantly lower (p<0.05-0.001) or has a slight tendency to lower values (p=0.083) than in patients with benign nevi (respectively 19.1 %, 10.8 %, 15.5 % and 16.7 %);

– according to Matiegka, the bone component of body weight in healthy men was significantly lower (p<0.05) than in patients with melanocyte benign simple nevi (by 5.2 %);

- according to Matiegka, the fat component of body weight in healthy men was significantly higher (p<0.01) than in patients with melanocyte benign dysplastic nevi (by 21.0 %).

In the analysis of the distribution of somatotype components and indicators of the component composition of body weight *between patients with benign nevi*, men found: significantly lower (p<0.05-0.01) or tendencies to lower values (p=0.052-0.075) in patients with melanocyte benign dysplastic nevi – endomorphic, mesomorphic components of somatotype, muscular and skeletal components of body weight according to Matiegka than in patients with melanocyte benign simple nevi (respectively 20.4 %, 17.1 %, 9.3 % and 6.6 %); muscle component of body weight according to AIN than in patients with melanocyte benign simple (10.4 %), congenital (13.4 %) and non-melanocyte benign (8.9 %) nevi; fat component of body weight according to Matiegka than in patients with melanocyte benign simple (by 17.2 %) and non-melanocyte benign simple (by 14.2 %) nevi; as well as significantly higher (p<0.05) or a slight tendency to higher values (p=0.081) of the ectomorphic component of the somatotype than in patients with melanocyte benign simple (by 35.5 %) and non-melanocyte benign nevi (by 36.8 %).

The differences in the distribution of Heath Carter's somatotype type between practically healthy and Ukrainian men with benign nevi, or between men with benign nevi, are presented in Table 2.

Table 2

| Somototuna tuna | $U_{aalthy}(n-92)$ | Patients with benign nevi | | | | |
|---------------------|--------------------|---------------------------|-------------|-------------|-------------|--|
| Somatotype type | Healthy (II=82) | MBSN (n=34) | MBDN (n=27) | MBCN (n=14) | NMBN (n=17) | |
| Endomorphs | 2.4 | 0 | 0 | 0 | 0 | |
| Mesomorphs | 47.6 | 58.8 | 48.1 | 78.6 * 0 | 64.7 | |
| Ectomorphs | 11.0 | 5.9 | 14.8 | 0 | 0 | |
| Ecto-mesomorphs | 15.9 | 2.9 t | 18.5 | 7.1 | 5.9 | |
| Endo-mesomorphs | 15.9 | 26.5 | 11.1 | 7.1 | 23.5 | |
| Middle intermediate | 7.3 | 5.9 | 7.4 | 7.1 | 5.9 | |

Comparison of the distribution of somatotypes between healthy and Ukrainian men with benign nevi (%)

In the analysis of the distribution of types of somatotype *between healthy and patients with benign nevi or between patients with benign nevi* men found:

– the frequency of mesomorphic somatotype in healthy men is significantly lower (p<0.05) than in patients with melanocyte benign congenital nevi (by 39.4 %), and the frequency of ecto-mesomorphic somatotype has a pronounced tendency to higher values (p=0.053) than in patients with melanocyte benign simple nevi (by 81.8 %);

– the frequency of mesomorphic somatotype in patients with melanocyte benign dysplastic nevi tends to be higher (p=0.068) than in patients with melanocyte benign congenital nevi (by 38.8 %), and the frequency of ecto-mesomorphic somatotype (p=0.068) is significantly higher (p<0.05) than in patients with melanocyte benign simple nevi (by 84.3 %).

The influence of somatotype components on the course of diseases, the risk of their occurrence and in turn life expectancy, mortality and disability is beyond doubt. Among the key indicators studied by scientists are body weight, body mass index, percentage of fat and muscle tissue in the body, waist circumference etc. Extensive research, which includes large populations of different sex, nationality and age, allows creating an idea of the influence of different components of somatotype in people of different groups on the course of a disease, process [3, 4, 6, 10, 15].

For example, a survey of more than 11,000 people found that not only body mass index but also the percentage of muscle and fat in the body played a key role in mortality. BMI≥22 in combination with a low percentage of muscle tissue is associated with an increased risk of mortality [3].

The thickness of the skin folds can be used to predict the risk of head and neck cancer in the European population (p<0.05). In addition, there were significant differences in the confidence intervals of the hip circumference for men and women and significant differences in the thickness of the skin folds of the thigh for the European population and the Asian population of people with head and neck cancer [4].

Human body weight is one of the key indicators that scientists believe is associated with the development of cancer. According to various population-based studies, weight gain is associated with 20 % of all cancers in the world. The role of human body weight even in the development of various histological subtypes of breast and endometrial cancer has been proven. These mechanisms are realized due to the influence of weight on the production of sex hormones, insulin resistance, the presence of chronic inflammation, the influence of adipose tissue on cell migration and cancer cells, tissue hypoxia, oxidative stress, etc. [6].

A sample of more than 135,000 women with a mean follow-up of 6.8 years was used in a study by Omiyale W. et al. [10]. During this time, they recorded 706 cases of endometrial cancer. The authors found a positive relationship between the risk of this type of cancer and increased BMI, as well as increased waist circumference, the ratio of waist and hip circumference and the risk of endometrial cancer.

Similarly, an association between an increased BMI and an increased risk of melanoma was found in a study of 707 patients with a follow-up period of 10 years (2005 to 2015). In addition, it was found that the BMI from 25 to 34.9 kg/m² indicates a higher chance of survival in melanoma [15].

The data found during our study are consistent with the trend presented in other studies and thus indicate a direct impact of anthropometric indicators on the occurrence of different types of nevi in the Ukrainian population.

Conclusions

1. In practically healthy Ukrainian men, in comparison with patients with benign nevi, in most cases lower values of mesomorphic component of somatotype and muscle component of body weight according to Matiegka and AIN, as well as higher values of ectomorphic component of somatotype have been found.

2. The vast majority of significant discrepancies between somatotype components and body weight components between patients with benign nevi Ukrainian men are mainly related to higher values of these indicators (except for the ectomorphic component of somatotype) in patients with melanocyte benign simple nevi than melanocyte benign dysplastic nevi.

3. Significant differences in the type of somatotype both between healthy and Ukrainian men with benign nevi and between Ukrainian men with benign nevi have not been established.

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