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DYNAMICS OF BIOIMPEDANCE EXAMINATION INDICATORS OF OVERWEIGHT/OBESE PATIENTS IN COMBINATION WITH INSULIN RESISTANCE AGAINST THE BACKGROUND OF COMPLEX TREATMENT USING VITAGEN No. 29 METABOLISM PLUS

SUMMARY. The article describes and analyzes the dynamics of bioimpedasmetry indicators in patients with overweight/obesity and insulin resistance against the background of therapy using a multicomponent nutraceutical.

The aim – to evaluate changes in indicators of body composition in patients with overweight/obesity and insulin-resistance against the background of complex therapy with the additional use of a nutraceutical containing extract of Gymnema, Mamordica, 7-keto-dehydroepiandrosterone, L-tyrosine, Choline, Inositol and microelements.

Materials and Methods. 90 patients with overweight/obesity and IR who were examined by a gastroenterologist-nutritionist during 2024 were studied.

Results. It was established that complex therapy using a nutraceutical containing Gymnema extract, Momordica charantia, 7-keto-dehydroepiandrosterone, L-tyrosine, Choline, Inositol, and microelements has a positive effect on indicators of body composition and correction of insulin resistance in such patients. Their lipolytic effect, positive effect on metabolism, carbohydrate metabolism and modulation of indicators of the component composition of the body have been established. Namely, a month after the treatment, a decrease in the HOMA index was noted in all studied groups (to 5.23±1.24 in the group I, 3.53±1.04 in the group II, and 3.22±0.92 in the group III).

After comprehensive treatment of patients of all studied groups for a month, a repeated study of the component composition of the body was carried out and the BMI index was calculated. The level of fat mass in these patients decreased to 29.06±3.46 % (against 33.9±5.08 % before treatment, p=0.04), the level of muscle mass increased to 32.5± 4.83 kg (against 30.44±4.66 kg before treatment), liquid – up to 50.24±1.69 % (against 47.2±2.73 % before treatment, p=0.01).

We also established a negative correlation between muscle mass indicators and BMI, weight, HOMA index (R=-0,54, p=0.002; R=-0.61, p=0.015; R=-0.68, p=0.0001), which makes it possible to confirm the role of the studied nutraceuticals on increasing muscle mass, weight correction and IR in these patients.

KEY WORDS: overweight; obesity; insulin resistance; bioimpedance measurement; nutraceutical; treatment.

Introduction. Obesity has become an epidemic worldwide and is a significant public health concern [1]. Obesity has nearly tripled since 1975, and it is estimated that 51 % of the population will be obese by 2030 [2]. Obesity-induced chronic pro-inflammation contributes to a pivotal role in the development of insulin resistance (IR). As IR environments develop, β-cells fight back by producing more insulin in response to impaired glucose supply. If the IR condition stays steady over months and years, the β-cells work hard continuously to produce excess insulin to compensate for the glucose overload. Because of continuous overload, β-cells get worn out, causing an increase in glucose in circulation [3].

Obese individuals develop IR at specific points in their lifetime in more than 80 % of cases [4].

The impaired fat storage capacity of the adipose tissue results in ectopic fat deposition and contributes to the development of IR [5].

Unhealthy obesity is associated with several chronic conditions, such as kidney diseases, osteoarthritis, cancer, diabetes, sleep apnea, non-alcoholic fatty liver disease, hypertension, and cardiovascular diseases [6].

Many pathways connect stress and obesity. Stress can affect behavior by inducing overeating and consumption of foods that are high in calories, fat, or sugar, triggers physiological changes in the hypothalamic-pituitary-adrenal axis and can stimulate production of biochemical hormones and peptides such as leptin, ghrelin, and neuropeptide Y [7].

In the literature, there are not enough scientific articles in which indicators of the component composition of the body in interdependence with IR were comprehensively investigated. That is why it is important to conduct research in order to study new methods of optimizing the treatment of overweight/obesity against the background of IR.

The aim – to evaluate changes in indicators of body composition in patients with overweight/obesity and insulin-resistance against the background of complex therapy with the additional use of a nutraceutical containing extract of Gymnema, Mamordica, 7-keto-dehydroepiandrosterone, L-tyrosine, Choline, Inositol and microelements.

Materials and Methods. 90 patients with overweight/obesity and IR who were examined by a gastroenterologist-nutritionist during 2024 were studied. The age of the patients was 35 to 64 years, the average age was 49.7±14.6 years; there were 37 (41.1 %) men, 53 (58.9 %) women.

To establish IR, the index of insulin resistance (Homeostasis Model Assessment of Insulin Resistance) was calculated for all patients: HOMA-IR = fasting insulin (μIU/ml) x fasting glucose (mmol/l) / 22.5. IR was confirmed when the value of this indicator was more than 2.0. Also, all patients underwent an anthropometric examination with determination of height, weight, waist circumference and calculation of the body mass index (BMI).

All patients were divided into three groups. The first group included 30 patients who were on a balanced diet with a restriction on the content of simple carbohydrates. The second group included 30 patients who, in addition to a balanced diet, took a nutraceutical containing gymnema sylvestre (100 mg), momordica charantia (100 mg), azadirachta indica (80 mg), commiphora mukul (50 mg), syzygium cumini (50 μg), asphaltum (40 mg), zingiber officinale (40 mg), trigonella foenum-graecum (35 mg), picrorhiza kurroa (30 mg), ocimum sanctum (15 mg), the drug "Glibofit" in a dosage of 1 capsule 2 times a day for 3 months.

The third group included 30 patients who, in addition to a balanced diet, took the «Glibofit» nutraceutical, a drug that includes 7-keto-dehydroepiandrosterone (100 mg), L-tyrosine (100 mg), asparagus officinalis (100 mg), choline (50 mg), inositol (50 mg), manganese (5 mg), copper (500 μg), iodine (100 μg) – the drug "Vitagen metabolism plus" in a dosage of 1 capsule/day for 3 months.

The methodology of all studies corresponded to the Declaration of Helsinki in 1975 and its revision in 1983. Analysis and statistical processing of the results was carried out using the STATISTICA 10.0 computer program (StatSoft Inc, USA) using parametric methods for evaluating the obtained results.

Results and Discussion. To identify the effectiveness of IR correction in the studied patients, the HOMA-IR index was determined in all studied patients before and 1 month after the prescribed treatment (Fig. 1).

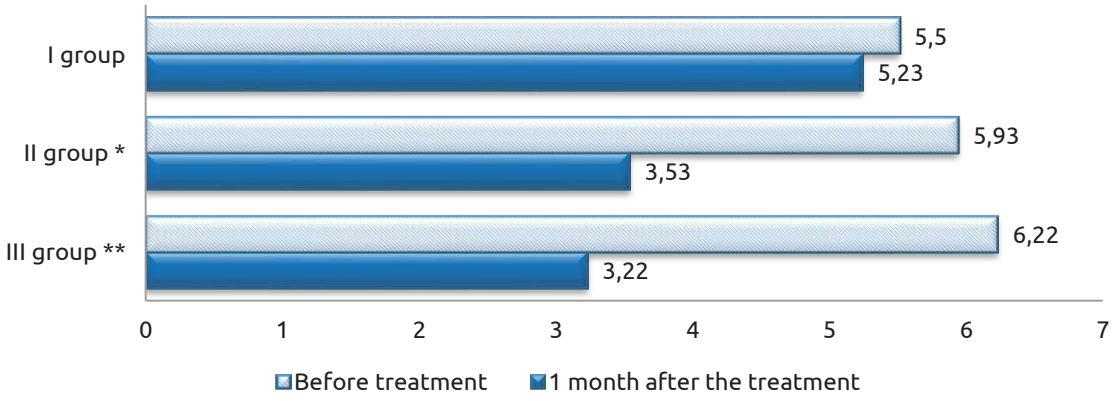

Fig. 1. Dynamics of the HOMA-IR index in the studied patients against the background of complex treatment

As can be seen from the above data, in all studied groups there was a violation of the sensitivity of insulin receptors and an increase in the HOMA-IR indicator. These values were at the level of 5.5±1.41 in patients of group I, 5.93±1.34 in patients of group II and 6.22±1.37 in patients of group III, respectively. A month after the treatment, a decrease in the specified indicator was noted in all studied groups (to 5.23±1.24 in the group I, 3.53±1.04 in the group II, and 3.22±0.92 in the group III).

However, in patients of group II and group III, who additionally took nutraceuticals as part of the complex treatment, these indicators differed significantly from those of the group I and were the closest to the reference values. The detected changes can be explained by the positive effect of gymnema extract on the glucose level (due to stimulation of insulin release, restoration of pancreatic cells and reduction of glucose absorption from the intestines); mamordiki extract – on IR (due to the content of insulin-like peptides and stimulation of glucose utilization by peripheral tissues); picrorhiza curroa – on the absorption of glucose in the intestines (by suppressing the activity of the α-amylase enzyme,

reducing the breakdown of starch and other carbohydrates into glucose and reducing the level of postprandial hyperglycemia); as well as due to the presence of antioxidant, anti-inflammatory, adaptogenic and immunomodulatory effects of other components of the drug "Glibofit" in the studied patients.

After analyzing anthropometric indicators and bioimpedancemetry, all patients were diagnosed with obesity/overweight. After comprehensive treatment of patients of all studied groups for a month, a repeated study of the component composition of the body was carried out and the BMI index was calculated. Table 1 shows the results of these studies.

Table 1. Dynamics of bioimpedance measurements in the studied patients and the control group

Indicator	Group I (n=30)		Group II (n=30)		Group III (n=30)	
	Before treatment	1 month	Before treatment	1 month	Before treatment	1 month
BMI (kg/m^2)	29.72±3.12	29.2±3.06	29.49±2.05	28.69±2.04	29.5±2.0	26.99±1.99*
Fat mass (%)	36.91±6.2	35.76±5.92	33.79±5.13	29.87±4.06*	33.9±5.08	29.06±3.46*
Muscle mass (kg)	30.03±4.03	29.38±4.02	30.56±4.9	30.92±4.72	30.44±4.66	32.5±4.83
Liquid content (%)	50.18±1.9	48.9±1.25	49.88±1.93	50.28±1.75	47.2±2.73	50.24±1.69*
Bone mass (%)	10.89±0.76	10.88±0.72	10.6±0.96	10.67±0.83	10.59±0.95	10.61±0.93

Note: * – statistically significant difference between indicators before and 1 month after treatment ($p<0.05$).

Analyzing the indicators, it can be noted that positive dynamics of bioimpedance examination indicators were observed in all patients against the background of complex treatment. However, when comparing indicators in patients of groups II and III a month after the prescribed treatment, a reliable difference between these indicators was established and a more pronounced positive trend in patients of group III, who additionally took nutraceutical drugs against the background of basic treatment. At the same time, the level of fat mass in these patients decreased to 29.06±3.46 % (against 33.9±5.08 % before treatment, p=0.04), the level of muscle mass increased to 32.5± 4.83 kg (against 30.44±4.66 kg before treatment), liquid – up to 50.24±1.69 % (against 47.2±2.73 % before treatment, p=0.01). Such changes confirm the positive effect of gymnema sylvester and marmordica extract on the ability to normalize fat metabolism and increase the catabolism of adipose tissue by reducing the inflammatory response and oxidative stress and increasing lipolysis in the studied patients. Also, the content of 7-oxo-DHEA, a natural metabolite of the human body, in these nutraceuticals promotes lipolysis, preservation and increase of muscle tissue. The presence of copper and manganese, activators of fat-burning enzymes and energy production, improve the effectiveness of obesity correction and contribute to weight loss.

To study the dependence and influence of the prescribed treatment on the indicators of the bioimpedance study, we conducted a correlation analysis between the indicators of anthropometry and bioimpedance examination in the studied patients. Table 2 shows the results of this analysis.

Table 2. The results of the correlation analysis between the indicators of the studied groups

Indicator	Fat mass (%)		Muscle mass (kg)		Liquid content (%)	
	R	p	R	p	R	p
BMI (kg/m^2)	0.72	0.0001	-0.54	0.002	-0.34	0.006
Weight (kg)	0.67	0.007	-0.61	0.015	-0.57	0.004
HOMA index	0.66	0.005	-0.68	0.0001	-0.28	0.001

Analyzing the results of the correlation analysis, we established a direct correlation between BMI indicators and fat mass (R=0.72; p=0.0001), weight and fat mass content (R=0.67; p=0.007), HOMA index and fat content (R=0.66; p=0.005) in the studied patients. Such results confirm the positive effect of the studied nutraceuticals on carbohydrate metabolism, weight correction due to the reduction of fat mass. We also established a negative correlation between muscle mass indicators and BMI, weight, HOMA index (R=-0.54, p=0.002; R=-0.61, p=0.015; R=-0.68, p=0.0001), which makes it possible to confirm the role of the studied nutraceuticals on increasing muscle mass, weight correction and IR in these patients.

Therefore, adding to the complex therapy of patients with overweight/obesity and IR nutraceuticals containing extract of gymnema, mamordica, 7-ketodehydroepiandrosterone, L-tyrosine, choline, inositol and microelements is an effective way that contributes to the normalization of indicators of IR and bioimpe-

dancemetry. At the same time, these drugs are natural, well tolerated by patients and do not cause side effects.

Conclusions: 1. Nutraceuticals containing gymnema extract, mamordica, 7-keto-dehydroepiandrosterone, L-tyrosine, choline, inositol and trace elements are effective and safe drugs in the complex treatment of patients with overweight/obesity and IR. 2. The appointment of nutraceuticals as part of the complex treatment of patients with overweight/obesity and IR effectively affects the indicators of obesity and HOMA-IR in these patients.

Prospects for further research: Further study of the effects of gymnema extract, mamordica, 7-keto-dehydroepiandrosterone, L-tyrosine, choline, inositol and trace elements on carbohydrate metabolism and their role in the treatment of overweight/obesity.

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Authors' contribution:

S. M. Opalenyk – research design, data collection, statistical data processing, description of research results and writing of the publication.

O. T. Oleksyk – conducting research, collecting data, forming research conclusions.

O. O. Khizhnyak – scientific support, literature review.

Conflict of interest. There is no conflict of interest.

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ДИНАМІКА ПОКАЗНИКІВ БІОІМПЕДАНСНОГО ОБСТЕЖЕННЯ ХВОРИХ З НАДЛИШКОВОЮ ВАГОЮ / ОЖИРІННЯМ У ПОЄДНАННІ З ІНСУЛІНОРЕЗИСТЕНТНІСТЮ НА ТЛІ КОМПЛЕКСНОГО ЛІКУВАННЯ З ВИКОРИСТАННЯМ ВІТАГЕН № 29 METABOLISM PLUS

РЕЗЮМЕ. В статті описано та проаналізовано динаміку показників біоімпедансметрії у хворих з надлишковою вагою / ожирінням та інсулінорезистентністю на фоні терапії із використанням полікомпонентного нутріцевтика.

Метою роботи було оцінити зміни показників компонентного складу тіла у пацієнтів із надмірною масою тіла / ожирінням та інсулінорезистентністю на тлі комплексної терапії з додатковим застосуванням нутріцевтика, що містить екстракт гімнеми, мамордики, 7-кето-дегідроепіандростерон, L-тирозин, холін, інозит і мікроелементи.

Матеріал і методи. Обстежено 90 пацієнтів із надлишковою масою тіла / ожирінням та ІР, які протягом 2024 року лікувалися у гастроентеролога-дієтолога.

Результати. Встановлено, що комплексна терапія із використанням нутріцевтика, що містить екстракт джимнеми, мамордики, 7-кето-дегідроепіандростерон, L-тирозин, холін, інозитол та мікроелементи, має ефективний вплив на показники компонентного складу тіла та корекцію інсулінорезистентності у таких пацієнтів. Зокрема, встановлено їх ліполітичну дію, позитивний вплив на метаболізм, вуглеводний обмін та модуляцію показників компонентного складу тіла. Зокрема, через місяць після лікування відзначалося зниження індексу HOMA в усіх досліджуваних групах (до 5,23±1,24 у I групі, 3,53±1,04 у II групі та 3,22±0,92 у III групі).

Через місяць після комплексного лікування пацієнтів усіх досліджуваних груп було проведено повторне дослідження компонентного складу організму та розраховано ІМТ. Рівень жирової маси у цих пацієнтів знизився до (29,06±3,46) % (проти (33,9±5,08) % до лікування, p=0,04), рівень м'язової маси підвищився до (32,5±4,83) кг (проти (30,44±4,66) кг до лікування), рідини – до (50,24±1,69) % (проти (47,2±2,73) % до лікування, p=0,01).

Також було встановлено негативний кореляційний зв'язок між показниками м'язової маси та ІМТ, вагою, індексом HOMA (r=-0,54, p=0,002; r=-0,61, p=0,015; r=-0,68, p=0,0001), що дає змогу підтвердити роль досліджуваних нутріцевтиків у збільшенні м'язової маси, корекції ваги та ІР у цих пацієнтів.

КЛЮЧОВІ СЛОВА: надлишкова вага; ожиріння; інсулінорезистентність, біоімпедансметрія; нутріцевтик; лікування.

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