ABORDĂRI MODERNE PENTRU PREVENIREA BULIMIEI NERVOASE ŞI A ANOREXIEI NERVOASE

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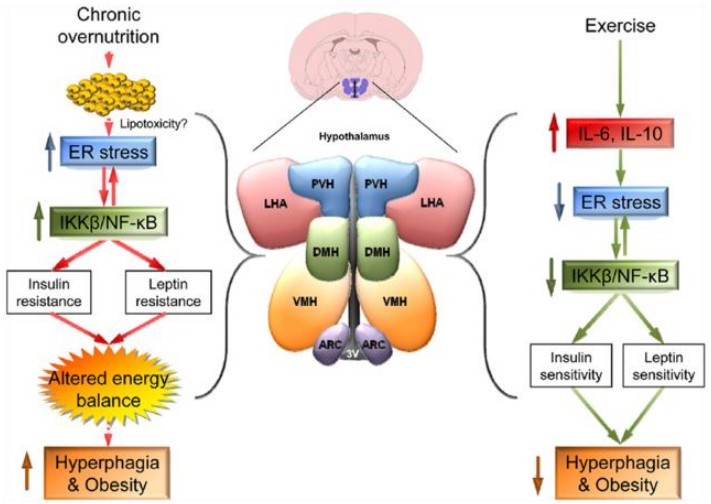
MODERN APPROACHES FOR PREVENTING BULIMIA NERVOSA AND ANOREXIA NERVOSA

The tested approach in the prevention of bulimia nervosa and anorexia nervosa is based on the use of a program of regular physical and cognitive-emotional training that alters the balance of motivation and satisfaction (pleasure). The exercise program is combined with a metered hedonic diet. Revealed shifts in body composition, the ratio of fat and muscle masses, a decrease in the level of amotivation and an increase in internal motivation.

Keywords: *feeding behavior, depression, anxiety, overnutrition, exercise*.

Introduction. Since the seventeenth century, it has been suggested that emotional stress plays a role in the etiology of type 2 diabetes and that depression is a risk factor for feeding behavior disorders. Not only depression, but general emotional stress with anxiety, sleep problems, anger and hostility are associated with an increased risk of metabolic disorders and type 2 diabetes. Neuropsychological disorders in the etiology of eating disorders are complex, persistent, and difficult to treat. The hypothalamus is the main neuroendocrine center for the integration of food signals and coordination of energy expenditure, food intake, and eating behavior. Problems associated with metabolic imbalance, non-optimized body weight and body composition are mainly solved pharmaceutically and nutritional, while the cognitive and psychoemotional status of an individual is little taken into account. The epidemiology of bulimia nervosa and anorexia nervosa proves the close dependence of eating behavior on personal psychoemotional status. It is no coincidence that individuals with anorexia nervosa and/or bulimia nervosa are most likely to have a primary anxiety disorder that began before their eating disorder began. Chronic psycho-emotional stress, so common in society, causes cravings for salty, sweet and fried foods: foods that deliver a surge of energy and pleasant sensations. Namely, uncontrolled stress conditions the motivation to consume hedonic food for emotional relief. Eating food with a pronounced taste is associated with the intake of an increased amount of easily digestible carbohydrates, saturated fatty acids, and proteins into the body. A high carbohydrate, fat and protein index of food leads to the development of lipotoxicity, inflammation of the hypothalamus and a decrease in the sensitivity of the reward center. In addition, incorrect food preferences during pregnancy of the mother cause inflammation of the hypothalamus in the fetus and epigenetic changes in its body, which will manifest itself in its mature life. Accurate regulation of the activity of various links of the system of neural circuits, including the orexinergic lateral region of the hypothalamus (LH), the dopaminergic center in the ventral tegmental region

(VTA), the nucleus accumbens (NAc) and the prefrontal region of the neocortex, dependent on the status of endocrine and nutritional signals, allows balancing psycho-emotional motivation, satisfaction with nutrient intake. Consumption of high-calorie foods high in fat with chronic overeating and a sedentary lifestyle leads to an increase in the accumulation of triglycerides not only in adipose tissue, but also in other tissues. In addition, increased plasma concentrations of non-esterified free fatty acids and lipid-laden hypertrophic adipocytes increase insulin resistance. The imbalance in the absorption and use of fatty acids, even in the absence of metabolic disturbances, leads to the accumulation of toxic types of lipids, which leads to tissue and organ dysfunction. Lipid-induced apoptosis, ceramide accumulation, overproduction of reactive oxygen species, endoplasmic reticulum stress, and mitochondrial dysfunction may play a role in the pathogenesis of lipotoxicity. The hypothalamus determines the availability of circulating levels of glucose, lipids, and amino acids, thereby altering nutrition to match the levels of these molecules. However, the hypothalamus is as vulnerable to lipotoxicity as other tissues that accumulate ectopic lipids. Chronic overeating (hyperphagia) generates repetitive and constant signals that induce endoplasmic reticulum stress (ER stress) in the hypothalamus before obesity, activate an inhibitor of the beta-subunit of nuclear factor kappa B kinase / nuclear factor kappa B (IKKβ / NF-κB) causing insulin and leptin resistance. Regular physical training, on the other hand, lowers ER stress and suppresses IKKβ / NF-κB, increasing insulin and leptin sensitivity (Fig.) [1].



[Martínez de Morentin P.B., López Martinez., 2010]

Fig.1. Differences in the effect of chronic overeating and physical training on the centers of the hypothalamus

The aim of the work is to test an approach in the prevention of the occurrence of anorexia and bulimia of nervous origin (anorexia nervosa, bulimia nervosa), based on regular physical and psycho-emotional training in combination with a dosed hedonic diet and monitoring the level of motivation and satisfaction (pleasure).

Material and method. The work was performed on practically healthy volunteers (male) aged 16-18 years. Statistical comparisons were made between two groups: persons who systematically train in sports sections (n = 6) and consume hedonic food according to our recommendation and persons who did not exercise (n = 6). Anthropometric measurements were performed: The Body Mass Index (BMI) and the Waist-Hip Ratio (WHR) were calculated. The balance of motivation and satisfaction was determined using International Scales. The definitions of motivation indicators are based on the theory of self-determination (self-determination, SDT), which has been highlighted as a consistent and specific way to analyze the motivational aspects associated with sports. The degree of interconnection of self-defined behavior was estimated according to 36 criteria (36 items). Assessing the balance of activity of systems of activation, motivation and satisfaction requires tools that can identify and calculate the attributes associated with motivation and satisfaction. For athletes, two questionnaires have been specifically designed to meet the SDT assumptions: The Sports Motivation Scale (SMS) and the Behavioral Regulation in Sport Questionnaire (BRSQ). Multivariate analysis of behavior regulation in sports (BRSQ), applied to young athletes and non-athletes were carried out individually during one session for each young man involved in sports. We tried to avoid filling out the questionnaire in cases where athletes might be under stress. Thus, the survey was carried out when the athletes were not under conditions of increased physical stress or when they were experiencing emotional stress. The choice of one of them should depend on how their psychometric properties correspond to the purpose of the study. Differences in life satisfaction indicators (conventionally: pleasure or happiness) are broken down into components similar to traits and states. The approach being developed can use tests using the life satisfaction scale, the Steen Happiness Index (SHI). The Steen Index is more sensitive to situational changes than the Satisfaction with Life Scale (SWLS), which is currently used as the gold standard. Tracy Steen and colleagues developed the SHI to measure emotional satisfaction with life, engagement in activity, and the meaning of life [2]. This scale measures the shifts in the level of satisfaction caused by positive psychological influences. The Steen Happiness Index Scale contains 20 items and requires participants to carefully read a series of statements and choose the one that best describes their condition over the past week. Answer options range from negative ("I'm bored most of the time") to very positive ("Most of the time I am delighted with what I do"). Each answer is assigned a score from 1 to 5, with 5 indicating the most positive answer. Criteria (items) cover the areas of pleasure ("My life is filled with pleasure"), involvement ("During all my activities, time passes so quickly that I do not even notice it") and the meaning and meaning of life ("I have a very clear idea about my purpose in life"). The total score was the sum of the individual items. Descriptive statistics and reliability scoring of this and other scales were effectuated.

Results and discussion. The average values of the index "waist-hip ratio" (WHR) significantly differed in the compared groups of young men. For individuals from the group of athletes: The WHR ratio was 0.88±0.02 for the representatives of the group of athletes and 0.99±0.03 * for the representatives of the group of athletes. The value of the body mass index (BMI) among the representatives of the group of athletes

was 22.3±0.7; among representatives of the group of athletes 25.4±0.8; but only in the control group: 22.3±1.3 *. The results of determining the body composition (caliperometry) of the ratio of fat and muscle mass in athletes showed a decrease in fat and an increase in muscle mass (Tab.1).

Table 1. Body Composition Indices in Regular Sports Workers

No	Measurement areas for skin grip thickness	The result of measuring the thickness of the skin grip (mm)	Body composition indices	The result of calculating the value of the body composition indicator (kg;%)
1	triceps	10.3±0.8	Density	1.069±0.082
2	chest	12.7±1.1	Fat mass abs. (kg)	11.12±0.89*
3	middle axillary	12.9±1.0	Muscle mass abs. (kg)	65.13±0.81*
4	subscapularis	12.3±0.8	Fat mass relative. (%)	14.6±1,0
5	abdominal	16.2±1.3	Muscle mass relative. (%)	85.4±4.2
6	suprailiac	15.8±1.0	Population mean	15.65
7	Femoral (quadriceps)	15.6±1.4	Score	71

Table 2. Results of determining body composition in individuals who do not practice regular physical training

No	Measurement areas for skin grip thickness	The result of measuring the thickness of the skin grip (mm)	Body composition indices	The result of calculating the value of the body compositio n indicator (kg;%)
1	triceps	11.5±0.9	Density	1.065±0.082
2	chest	14.3±1.0	Fat mass abs. (kg)	14.66±0.99
3	middle axillary	15.2±1.1	Muscle mass abs. (kg)	58.74±1.15
4	subscapularis	13.9±0.9	Fat mass relative. (%)	20.0±1.1
5	abdominal	18.5±1.2	Muscle mass relative. (%)	80.0±4.3
6	suprailiac	17.9±1.1	Population mean	16.45±1.27
7	Femoral (quadriceps)	16.9±1.8	Score	74

A practical approach to preventing bulimia nervosa and anorexia nervosa involves monitoring the level of motivation, which is known to be supported by the interaction of the brain activating systems and reward systems. Using SDT, we establish, in particular, different degrees of motivation, ranging from less to more self-determined. BRSQ is based on the use of constructs related to amotivation and intrinsic motivation, located at opposite ends of the entire sequence of factors. Whereas, constructs associated with extrinsic motivation and its corresponding regulators (extrinsic, introjected, identified and integrated) are located in the center (Tab.3 and 4). The application of the BRSQ questionnaire allows us to conduct a factor analysis of the regulation of behavior during sports training (BRSQ) according to 36 criteria (item) and 9 factors: factor 1 (AMOT) – amotivation; factor 2 (REEX) – extrinsic motivation of external regulation; factor 3 (REIJ) – external motivation for introjected adaptation; factor 4 (REID): external regulation of the identified motivation; factor 5 (REIG): extrinsic motivation for integrated regulation; factor 6 (MIGL): global intrinsic motivation; factor 7 (MIOB): intrinsic motivation to achieve goals; factor 8 (MIEE): intrinsic motivation for stimulating experiences; factor 9 (MICH): intrinsic motivation to acquire knowledge. The results of statistics and Cronbach's alpha-coefficient of the subscales of the sports behavior regulation questionnaire (BRSQ) applied to young athletes and non-athletes demonstrate a decrease in the correlation coefficient between the types of motivation regulation.

Table 3; Table 4. Analysis of motivation in non-exercising and exercising individuals (the correlation between the factors on the diagonal is represented by square values, r^2)

Factors	Mean	Stand. deviation	Cronbach's alpha	AMOT	REEX	REIJ	REID	REIG	MIGL	MIOB	MIEE
AMOT	2,21	0,36	0,61								
REEX	2,33	0,50	0,54	0,84							
REIJ	2,42	0,66	0,43	0,33	0,05						
REID	5,40	0,76	0,54	-0,19	-0,19	-0,09					
REIG	5,33	0,88	0,71	-0,31	-0,17	0,02	0,70				
MIGL	4,98	0,84	0,52	-0,34	-0,29	-0,19	0,62	0,67			
MIOB	3,00*	0,74	0,59	-0,33	-0,25	-0,19	0,75	0,55	0,23		
MIEE	4,02*	0,76	0,50	-0,39	-0,34	-0,23	0,61	0,58		0,90	
MICH	5,28	0,82	0,45	-0,29	-0,29	-0,16	0,50	0,57		0,52	0,68

Factors	Mean	Stand. deviation	Cronbach's alpha	AMOT	REEX	REIJ	REID	REIG	MIGL	MIOB	MIEE
AMOT	1,03*	0,41	0,81								
REEX	2,27	0,50	0,84	0,78*							
REIJ	2,62	0,66	0,83	0,74*	0,85*						
REID	5,45	0,76	0,74	-0,19	-0,19	-0,09					
REIG	5,79	0,88	0,71	-0,31	-0,17	0,02	0,70				
MIGL	5,98	0,84	0,82	-0,34	-0,29	-0,19	0,62	0,67			
MIOB	5,99	0,90	0,79	0,33	0,25	0,19	0,75	0,55	0,80*		
MIEE	6,01	0,96	0,80	-0,39	-0,34	-0,23	0,61	0,58	0,75	0,81*	
MICH	5,48	0,82	0,85	-0,29	-0,29	-0,16	0,50	0,57	0,71	0,52	0,68

The Cronbach's alpha used in the analysis reflects the internal consistency of characteristics that describe one object, but is not an indicator of the homogeneity of the object. The coefficient is often used in social sciences and psychology to design

tests and to test their reliability. The found mean values for different factors varied from 2.21 to 5.43 with standard deviations from 0.31 to 0.88 (Tab.3). The found mean values for various factors varied from 1.03 to 6.01 with standard deviations from 0.41 to 0.96 (Tab.4). A decrease in amotivation (AMOT), an increase in the intrinsic motivation of MIEE, was found in persons who regularly perform sports training, compared with those who did not perform training.

Conclusion. Systematically performed physical and cognitive-emotional exercises allow directly balancing of the activating, motivation and reward systems (satisfaction and pleasure). Correction of feeding behavior based on the dosed diet with sufficiently high hedonic properties allows to naturally increase motivation and satisfaction and thereby balance the activity of the activation and reward systems. Systematically performed physical and cognitive-emotional exercises allow for an indirect balancing of the coordination activity of the systems of activation, motivation and reward (satisfaction and pleasure) and thus prevent the development of anorexia and bulimia of nervous origin (anorexia nervosa, bulimia nervosa). The Application of the Scale for Determining Motivation and Behavior Regulation in Sports (BRSQ) is an accessible method of detailed examination of the level of motivation in the implementation of not only sports training. The use of the Life Satisfaction and Happiness Scale (Steen Index, SHI) as a psychometric assessment tool can be useful for psychotherapy, counseling or training based on positive psychophysiology.

References:

1. MARTÍNEZ de Morentin P.B., LÓPEZ, M. In: *PLOS Biology*. 2010; 8(8): e1000464.
2. SELIGMAN, M.E.P., and STEEN, T.A. Positive Psychology Progress: Empirical Validation of Interventions. In: *American Psychologist*. 2005; 60(5): 410-421.