

Streszczenie w języku angielskim

Title: The Effects of Plant-Based Dietary Patterns on Selected Metabolic Parameters and Appetite-Related Traits in Individuals with Obesity and Obesity-Associated Comorbidities

Obesity and metabolic syndrome represent some of the most serious public health challenges of the 21st century, substantially increasing the risk of cardiovascular disease, type 2 diabetes, and premature mortality. Despite wide access to nutrition education, the long-term effectiveness of obesity treatment remains limited, highlighting the need to identify new dietary strategies that are sustainable over time. In recent years, plant-based diets have attracted growing scientific and public interest; however, the available evidence remains inconsistent, and many key questions regarding their effectiveness, underlying mechanisms, and impact on eating-related behaviors remain unanswered.

The primary objective of this doctoral dissertation was to evaluate the effects of different plant-based dietary models on selected metabolic parameters, appetitive traits, body weight, and body composition in adults, using both a cross-sectional study and a randomized dietary intervention. The research aimed to analyze dietary patterns and appetitive traits in a cross-sectional setting and to assess the effectiveness of various plant-based diets in reducing body weight and improving selected anthropometric, metabolic, and behavioral outcomes. The obtained results were intended to facilitate an evaluation of the practical relevance of the investigated dietary models in the context of their potential application in obesity and metabolic disorder treatment programs.

The dissertation is based on a cycle of three thematically related publications, including a narrative review, an observational study, and a randomized controlled trial.

Publication No. 1, *Plant-Based Diets and Metabolic Syndrome Components: The Questions That Still Need to Be Answered—A Narrative Review*, presents a narrative review of the current literature on the effects of plant-based diets on components of metabolic syndrome. The analysis demonstrated that plant-based diets are most frequently associated with lower body weight and beneficial effects on lipid and carbohydrate metabolism as well as blood pressure. However, the magnitude of these effects varied depending on diet type, intervention duration, and population characteristics. Significant knowledge gaps were identified, particularly the lack of direct comparisons between different plant-based dietary models within a single study protocol, the limited number of randomized controlled trials, and insufficient consideration of behavioral and psychological factors. The review highlighted the need for

further well-designed interventional studies to enable a more precise evaluation of the effectiveness and clinical potential of specific dietary patterns.

Publication No. 2, *Plant-Based vs. Animal-Based Diets: Appetitive Traits and Dietary Patterns in Adults Based on Cross-Sectional Surveys*, comprised a cross-sectional study of 553 adults comparing plant-based and animal-based dietary patterns with respect to body weight, BMI, and appetitive traits assessed using the Adult Eating Behaviour Questionnaire (AEBQ). Individuals reporting a higher proportion of plant-based foods in their diet exhibited lower body weight and BMI compared with those preferring predominantly animal-based dietary patterns. Analysis of appetitive traits revealed significant associations between dietary patterns and selected AEBQ dimensions. Higher plant food intake was associated with slower eating pace and lower food fussiness, whereas greater consumption of animal-based products was positively correlated with energy intake—promoting traits such as hunger, food responsiveness, and emotional overeating. However, the observed associations were characterized by small effect sizes and did not encompass all analyzed appetitive dimensions. The relationships between appetitive traits and body weight or BMI were selective, and together with the cross-sectional design of the study, did not allow causal inferences, underscoring the need for further interventional research.

Publication No. 3, *The VEGPREV Study: Effectiveness of Four Plant-Based Diets on Weight Loss, Metabolic Syndrome Components and Appetitive Traits in Overweight and Obese Individuals: a Randomized Controlled Trial*, reports the results of the 12-week randomized controlled VEGPREV trial involving 90 adults with overweight or obesity, randomly assigned to five groups: Mediterranean diet (MD), EAT-Lancet Planetary Health diet (EAT), lacto-ovo-vegetarian diet (LOV), vegan diet (VG), and a WHO-based control diet (CTRL). a total of 85 participants completed the study (94.4%).

After 12 weeks, all intervention groups demonstrated a significant reduction in energy intake compared with the control group (MD: -337.6 ± 229.2 kcal/day; EAT: -394.4 ± 243.6 kcal/day; LOV: -315.3 ± 221.4 kcal/day; VG: -554.9 ± 215.3 kcal/day vs. CTRL: $+77.5 \pm 214.8$ kcal/day; $p < 0.001$). The greatest reduction in energy intake was observed in the vegan diet group. The proportion of dietary energy derived from protein was significantly lower in all intervention groups compared with the control group (approximately 15% vs. 18% of energy; $p < 0.001$).

All intervention groups experienced a significant reduction in body weight by week 6, which was maintained through week 12, while body weight in the control group remained stable. The largest relative weight loss during the initial phase of the intervention was observed in the vegan group (approximately -4%), whereas after 12 weeks, the lowest body weight

values were achieved in the EAT-Lancet and vegan diet groups. During the second half of the intervention, a partial regain of body weight was observed in all intervention groups relative to week 6; however, final values remained significantly lower than baseline.

A gradual reduction in body fat percentage was observed across all intervention groups, with slightly greater reductions in the EAT and MD groups. Waist circumference decreased significantly in all intervention groups, with the most pronounced temporal dynamics observed in the EAT and LOV groups, and the largest absolute reduction recorded in the VG group. Changes in waist circumference in the control group were minimal. Regarding metabolic parameters – including lipid profile, fasting glucose and insulin concentrations, HOMA-IR, and blood pressure – no statistically significant differences were observed between intervention and control groups after 12 weeks, despite favorable trends, particularly in the VG and EAT groups. No significant changes were observed in appetitive traits assessed using the AEBQ, physical activity level, or quality of life, suggesting that the anthropometric improvements were primarily attributable to dietary modification rather than secondary behavioral or lifestyle changes.

Overall, the conducted research cycle demonstrated that plant-based diets differing in the degree of animal product exclusion may represent an effective short-term strategy for weight reduction and improvement of selected body composition parameters in individuals with overweight and obesity. The most pronounced anthropometric effects were observed with the vegan diet and the EAT-Lancet Planetary Health diet, indicating their potential utility in dietary practice. At the same time, short-term dietary interventions did not lead to significant changes in appetitive traits, carbohydrate metabolism, lipid profile, physical activity, or quality of life. The stability of these parameters suggests that weight loss was mainly driven by reduced energy intake and dietary structure rather than behavioral changes. The cross-sectional study further confirmed that relationships between appetitive traits, dietary patterns, and body weight are selective and complex, requiring cautious interpretation.

Taken together, these findings indicate that the effectiveness of plant-based diets in the treatment of overweight and obesity depends not only on the degree of animal product restriction but also on clinical context, intervention duration, and individual patient characteristics. The dissertation highlights the need for further long-term interventional studies involving larger populations to assess the durability of metabolic effects and the role of appetitive traits in the long-term effectiveness of plant-based dietary strategies.

The results provide a foundation for more informed and individualized dietary model selection in clinical practice and for the development of sustainable nutritional strategies that integrate health benefits with environmental considerations.