

MODERN NUTRITION-FOCUSED CATERING SERVICES AND THEIR EFFECT ON HUMAN HEALTH- A CASE STUDY OF CHANGES IN METABOLIC AND BODY COMPOSITION PARAMETERS AND MICROBIOTA RESPONSES

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ABSTRACT

The aim of this experimental work (a case study) was to compare dietary changes between a standard (routine) diet and modern personalized diet provided by nutrition catering service (experimental) diet including possible effects on body composition and specific metabolic parameters related to human health. The experimental diet had a positive effect on the metabolic parameters and body composition of the participating volunteer, while no appreciable changes were noted in her fecal microbiota composition. Further research is required to assess the utility of the dietary catering in prevention of obesity and metabolic diseases.

Keywords: food-catering services, human nutrition, dietary intake, metabolic health, fecal microbiota

INTRODUCTION

Nutrition-focused dietary catering services are companies that deliver nutritionally balanced meals to individuals. Such services, commonly referred to as dietary catering, are particularly popular in Poland (Dobiecka et al., 2025, Zborowski and Mikulec, 2022), with a rapid increase in the number of new companies during the COVID-19 pandemic (Bin Zarah et al., 2022). Since then, these services have broadened their offers to include a wide range of dietary options, from standard omnivorous to gluten- and lactose-free diets, as well as vegetarian and vegan choices (Maj, 2024). Menus are designed by dietitians or nutritionists, who ensure appropriate energy content and nutritional balance (Hussain, 2017). To date, only a limited number of studies have investigated the effects of such dietary services on human health (Pohořelá et al., 2022). Moreover, unhealthy dietary habits lead to overweight and obesity which are a global public health problem with current worldwide prevalence of (43% and 16 %, respectively) in adult population (WHO, 2025). Hence,

the aim of this study was to evaluate metabolic outcomes and gut microbiota responses to dietary catering intervention. It was hypothesized that the use of a nutritionally balanced catering may improve metabolic health while modulating the composition of gut microbiota in a positive way (Arshad et al., 2026).

MATERIALS AND METHODS

This contribution describes a case study of a healthy 39-year-old female who used a dietary catering service for 28 days, receiving a standard (experimental) diet and probiotic supplementation. The intake of selected macronutrients for routine (28 day daily dietary record before the experiment) and experimental diet was assessed within the study. Volunteer's metabolic parameters, as well as body composition, were assessed before the intervention and twice during the study period. Multiple faecal samples were collected for genomic DNA extraction used for microbiota analysis (16S rRNA V3–V4 region Next Generation Sequencing), and correlations between microbiota composition and nutrient intake were examined.

RESULTS

Overall, the dietary intervention (experimental diet) significantly increased protein and fiber intake, while also consumption of cholesterol and increased total energy intake ($p > 0,05$). However experimental diet resulted in favourable changes in body composition, including a reduction in fat mass (by 10 %) and an increase in lean body mass. Exceeded fiber intake (from average 14 g/day in routine diet to 38 g/day in provided experimental diet) had beneficial effects on blood lipid parameters, manifested by decreased triglycerides (by 27 %), total cholesterol and low-density lipoprotein levels by (15 % and 14 %, respectively). In addition, the probiotic supplementation seemed to decrease the fasting glucose status.

No substantial changes in overall microbiota composition were observed; however relative abundance of *Blautia* and Enterobacteriaceae decreased with the progress of the experiment. In contrast, faecal samples contained higher presence of beneficial genera such as *Bacteroides* and *Bifidobacterium*. Also, the abundance of several bacterial genera was correlated with the intake of specific nutrients, indicating a potential diet-microbiota interaction despite the overall structural stability. These findings highlight the potential of dietary catering as a practical strategy supporting metabolic health and disease prevention.

CONCLUSIONS

Modern possibilities and tools, such as nutrition-focused catering services providing nutritional balanced diet, may help to stabilize and improve the dietary habits of the human population and thus mitigate the tendency of increased civilization diseases and comorbidities associated with inadequate human nutrition. In this case study, we have confirmed that such an approach may indeed improve metabolic parameters in a healthy person within only 28 days. Nevertheless, larger studies that would allow us to quantify and assess the utility of dietary caterings in the prevention and treatment of obesity and related disorders are required. The educational value of these tools in terms of visualising optimal portion sizes and the composition of balanced nutrition may also be significant. Therefore, further studies in this area are warranted.

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REFERENCES

- Arshad, M. T., Ali, M. K. M., Awlqadr, F. H., Maqsood, S., Ikram, A., Hossain, M. S., Abdullahi, M. A., Rashed, M. M. (2026): Mitigation of Metabolic Diseases Through Personalized Nutrition: A Critical In-Depth Review. *Food Science and Nutrition*, 14(1). Available at: <https://doi.org/10.1002/fsn3.71387>
- Bin Zarah, A., Schneider, S. T., Andrade, J. M. (2022): Association between Dietary Habits, Food Attitudes, and Food Security Status of US Adults since March 2020: A Cross-Sectional Online Study. *Nutrients*, 14(21), 4636. Available at: <https://doi.org/10.3390/nu14214636>
- Dobiecka, D. P., Markiewicz-Żukowska, R., Socha, K., Naliwajko, S. K. (2025): New Dietary Trends—Meal Kit Delivery Services as a Source of Nutrients: A Scoping Review. *Nutrients*, 17(7), 1154. Available at: <https://doi.org/10.3390/nu17071154>
- Hussain, Z. (2017): Role of Dietitian in a Food Service Industry. *Nutrition and Food Science International Journal*, 3(1). Available at: <https://doi.org/10.19080/nfsij.2017.03.555604>
- Maj, A. (2024): Diet as a challenge and a strategy: on the phenomenon of diet rationalisation in everyday life. *Acta Universitatis Lodzianae. Folia Sociologica*, (89), 57–70. Available at: <https://doi.org/10.18778/0208-600x.89.04>
- Pohořelá, B., Poláchová, A., Růžicková, M., Doležal, M., Pulkrábová, J., Pánek, J. (2022): Nutritional evaluation of the full-day diet. *Czech Journal of Food Sciences*, 40(2), 118–129. Available at: <https://doi.org/10.17221/273/2021-cjfs>
- Zborowski, M., Mikulec, A. (2022): Dietary Catering: The Perfect Solution for Rational Food Management in Households. *Sustainability*, 14(15), 9174. Available at: <https://doi.org/10.3390/su14159174>
- World Health Organization (WHO) Reports data (2025): Obesity and overweight status [online]. Available at: <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
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