Evaluation of Anti-Neoplastic Activity of Vaginal Microbiota-Derived Postbiotics as a Potential Tool to Support Chemotherapy in the Gynecological Cancers: Preliminary in Vitro Findings

Joanna Wasiak
Department of Medical Biochemistry, Medical University of Lodz, 6/8 Mazowiecka Str., 92-215 Lodz, Poland

Agnieszka Pudlarz
Department of Medical Biochemistry, Medical University of Lodz, 6/8 Mazowiecka Str., 92-215 Lodz, Poland

Pola Głowacka
Department of Medical Biochemistry, Medical University of Lodz, 6/8 Mazowiecka Str., 92-215 Lodz, Poland

Janusz Szemraj
Department of Medical Biochemistry, Medical University of Lodz, 6/8 Mazowiecka Str., 92-215 Lodz, Poland

Monika Witusik-Perkowska
Department of Medical Biochemistry, Medical University of Lodz, 6/8 Mazowiecka Str., 92-215 Lodz, Poland

Abstract

The vaginal microbiota plays a crucial role in maintaining gynecological health, with dominant *Lactobacillus* species acting as natural barriers against infection and inflammation. Disruptions in this microbial ecosystem have been increasingly associated with the development and progression of gynecologic malignancies, including cervical and ovarian cancers. This study investigates the potential antineoplastic effects of postbiotics derived from *L. jensenii, L. crispatus,* and *L. gasseri,* key members of a healthy vaginal microbiota, using in vitro models of both cervical and ovarian cancer. Cervical cancer (CaSki) and ovarian cancer (OVCAR-3) cell lines were treated with postbiotics obtained as LAB-derived postculture supernatants alone and combined with standard chemotherapeutics used for cancer treatment (doxorubicin, cisplatin). Post-treatment evaluations included processes important for cancer growth and resistance (e.g. cell death and proliferation, treatment induced-senescence). Postbiotic treatment resulted in a slight decrease in neoplastic cell viability, and flow cytometric analysis revealed that bacterial metabolites can induce apoptosis; however, the effect was dependent on the LAB strain and varied between cancer cell lines. While postbiotics alone exerted a modest effect on cell viability, their combination with chemotherapeutics further decreased the percentage of viable cells compared to samples treated with anti-cancer agents only. Moreover, combinatory treatment with postbiotics and oncological drugs resulted in further decrease of proliferation rate induced by chemotherapeutics. The preliminary findings of this study suggest the therapeutic potential of postbiotics as adjunctive agents in gynecological oncology.

Acknowledgment

The study was supported by PRELUDIUM BIS research grant no. 2022/47/O/NZ7/01089, funded by the National Science Centre in Poland.