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Efficacy of *Lactobacillus rhamnosus* CRD11 against DMH Induced Colon Cancer in Rat Model

Chand Ram Grover* and Neha Tanwar

ICAR-National Dairy Research Institute (Deemed University), India

Colon cancer accounts over 1 million people & about 0.5 million death worldwide annually. Putrefactive bacteria play a vital role in diet related carcinogenesis by conversion of pro-carcinogen into carcinogen. Dietary modification may offer opportunity to prevent this menace. Present investigation was aimed to evaluate efficacy of lactobacilli of Indian origin in format of blueberry fortified probiotic *dahi* against 1, 2,-dimethyl hydrazine (DMH) induced colon carcinoma in rats. *In vitro* 29 lactobacilli strains were evaluated for anti-carcinogenic potentials by Ames test and anti-oxidative assay. Among these, 6 selected strains were validated for probiotic and techno-functional properties. *Lactobacillus rhamnosus* CRD11 and *L. plantarum* CRD2 exhibited anti-carcinogenic and techno-functional potential. Finally, *L. rhamnosus* CRD11 was selected for preparation of blueberry fortified probiotic *dahi* (BPD) based upon its compatibility with it. Response surface methodology (RSM) was applied by using rotatory design package 9.0.1 for optimization of conditions for preparation of BPD. The RSM recommended best combination of 8% blueberry pulp, 1.5 % inoculum level and 9 h incubation time for development of BPD. Developed formulation was analyzed for its sensory & overall acceptability on 100 point scale revealed overall acceptability score of 88.79 with shelf life of 21 days at 4±1°C storage temperature. Probiotic *dahi* (PD) and blueberry fortified probiotic *dahi* (BPD) along with control *dahi* (NCDC 167) efficacy was validated against DMH induced colon carcinogenesis in male wistar rats w.r.t. histological, biochemical, microbiological and molecular markers. Probiotic *dahi* alone and in combination with blueberry effectively prevented colon cancer as tumor incidence, multiplicity and volume were lower in both BPD and PD fed group. Both, PD and BPD fed group exhibited decrease in progression of preneoplastic biomarker such as aberrant crypt foci (ACF) and mucin depleted foci (MDF) and BPD *dahi* documented synergistic efficacy as compared to probiotic *dahi* alone. The PCNA labeling index, a marker for progression of colon carcinoma in GI tract increased progressively in rats challenged with DMH. Both PD & BPD exhibited synergistic effect by preventing rise in PCNA & p53 labeling index. The BPD fed group showed higher antioxidant (catalase & superoxide dismutase) and detoxification (glutathione-S-transferase) activity as compared to DMH group. The fecal β -glucuronidase activity was higher in DMH control group in comparison to BPD and PD fed groups. Gene expression study of bcl2, k-ras, c-myc, and cox-2 gene in rat colon tissues expressed their higher levels in DMH control group as compared to BPD & PD groups as latter two groups showed minimum genotoxic stress. Similarly, histological analysis revealed higher incidences of carcinoma tumors in DMH control group while no carcinoma was observed in PD and BPD fed groups. Inhibition of colon cancer was more in BPD fed group as compared to only PD fed group. Blueberry has ability to stimulate growth of used probiotic strain in preparation of BPD. Hence, it can be concluded that there might be synergistic interactions between blueberry and beneficial microbes in the colon as evidenced by enhanced protective effect against colon carcinogenesis. Present investigation has culminated into development of anti-carcinogenic blueberry fortified probiotic *dahi*. Hence, *L. rhamnosus* CRD11 and blueberry offers exciting opportunities in food and health industry for the development of health foods to improve health of population vis-à-vis health of human kind.

Biography:

Prof. (Dr.) Chand Ram Grover obtained his Doctorate & Masters' degrees in Dairying (Microbiology) from ICAR-National Dairy Research Institute, Karnal-132001, (Haryana), India. He joined Agricultural Research Service in 1997 as scientist after completion of doctorate program. Presently he is holding the post of principal scientist (Dairy Microbiology). His research priority areas include development of functional foods w.r.t. preventive health care microbiology, especially prevention of colorectal cancer and non alcoholic fatty liver diseases, food safety (bioremediation of microbial toxins and toxic metals), probiotic direct vat starter (DVS) technology, bio-preservation of dairy foods by application of bio-molecules and mitigation of antimicrobial resistance in food borne pathogens. He has published >100 research/ review/ technical articles/ conference proceedings in referred international and national journals. He has served Association of Food Scientist & Technologist (India) in various capacities (Vice President & Secretary) to create awareness among general public and food professionals about latest developments in food science.