

Abstract

Breast cancer is considered is the most common type of tumor to occur in women. Approximately 1.7 million cases of breast cancer are reported every year. New therapeutic and preventive strategies to control or minimize the incidence of breast cancer are the need of the hour. In the past few years, the use of probiotics has been vastly commercialized due to their ability to confer great health benefits on host including their anticancer properties. Moreover, there has been a growing concern for proposing a curative and safe preventive agent for the treatment of different types of tumors including breast cancer. The current study aimed at investigating the potential role of probiotic *Lactobacillus reuteri* in the treatment and prevention of breast cancer. This study devoted to identifying the anticancer effect of *Lactobacillus reuteri* in mice model by emphasizing on the underlying mechanisms through which they confer beneficial effects on host. The mice were divided into five primary groups. The first group was control group that was administered 0.5 ml PBS daily. Group II was the cancer control group. Breast cancer was induced in the mice by using Cadmium Chloride (2 mg/kg). Standard drug *tamoxifen* (100 mg/kg) was administered to mice in group III. Probiotic *Lactobacillus reuteri* (0.5 ml) was administered to mice in group IV. In group V, mice were orally administered Cadmium Chloride (2 mg/kg) for one month to induce breast cancer and then the mice were further divided into three groups: group VA was treated with *tamoxifen* (100 mg/kg), group VB was treated with *Lactobacillus reuteri* (0.5 ml), and group VC was treated with a conjugate of *tamoxifen* and *Lactobacillus reuteri*. The higher level of biomarkers i.e., TNF- α (40.9 \pm 4.2 μ g/ml), IL-6 (28.0 \pm 1.5 μ g/ml), IL-10 (60.2 \pm 2.0 μ g/ml), IFN- γ (60.2 \pm 2.0 μ g/ml), ALAT (167.2 \pm 6.2 U/l), ASAT (451.6 \pm 13.9 U/l), and MDA (553.8 \pm 19.6 U/l) was observed in group II (Cd group) that showed the induction of breast cancer tumor in female mice. However, in the treatment groups, the lower level of biomarkers i.e., TNF- α (18.0 \pm 1.1 μ g/ml), IL-6 (9.4 \pm 0.4 μ g/ml), IL-10 (20.8 \pm 1.1 μ g/ml), IFN- γ (20.8 \pm 1.1 μ g/ml), ALAT (85.2 \pm 3.6 U/l), ASAT (185 \pm 6.9 U/l), and MDA (246.0 \pm 7.5 U/l) was observed in group Cd+Tam+LR. The histopathological analysis of liver of mice treated with cadmium chloride showed liver hemorrhage with chronic inflammation. However, in the treatment groups, mild inflammation, and activation of Kupffer cells was observed. The group of mice that were given cadmium chloride dose in Cd group (cancer control group) expressed ductal carcinoma in mammary tissues. Relatively healthier branched ducts and adipocytes were observed in the mammary tissues of mice from the treatment groups. Histopathological analysis of kidney of mice in control group showed normal glomerular tufts, chronic inflammation in the glomerular tubules of mice from cancer control group, and relatively healthier glomerulus with mild inflammation in the treatment groups. The current study concluded that the use of probiotic *Lactobacillus reuteri* has great potential for the treatment and prevention of breast cancer.