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BIOLOGICAL STUDIES ON PROBIOTIC BACTERIA IN SOYMILK

By

ABDALLAH IBRAHIM GAD MOHAMMED
B.Sc. Agric. Sci. (General agricultural production), South Valley University, (2015)

A Thesis Submitted in Partial Fulfillment
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ABSTRACT

Abdallah Ibrahim Gad Mohammed: Biological Studies on Probiotic Bacteria in Soymilk, Unpublished M.Sc. Thesis, Department of Microbiology, Faculty of Agriculture Ain Shams University, 2021.

Five probiotic bacterial strains (*Lactobacillus plantarum* ATCC 14917, *Lactobacillus casei* DSM 20011, *Lactobacillus acidophilus* ATCC 20552, *Lactococcus thermophilus* DSM 20259, and *Bifidobacterium longum* B41409) were used as monoculture, and combined with them as consortia cultures for the fermentation of soymilk. The total number is 20 co-cultures, separated similarly into two parts, the first half of each co-culture consisted of two strains, and the second half of each co-culture consists of three strains. The findings revealed that these mono cultures were capable of fermenting soymilk during 8 h of fermentation time. The viability increased from 8.11 CFU/mL to 9.47 CFU/mL, pH was dropped of between 4.54 to 4.89, and total acidity increased from0.030 to 3.17%, while the co-cultures were used as two cultures the results recorded viability from 8.21 to 9.88 CFU/mL, pH from 4.87 to 4.51.

The chemical composition of soymilk consisted of protein (2.10 %), carbohydrate (2.43 %), fat (2.13), ash (0.18), and total solids (6.84) while fermented one consited of protein ranged from 3.12 to 3.95 %, carbohydrate from 1.51 to 2.24 %, fat from 1.40 to 1.92 %, ash 0.31 to 0.52 %, and total solids 7.48 to 8.57%. The antioxidant properties of fermented soymilk was determined and compared with non fermented one, the results shown an increase in DPPH scaving activity after soymilk fermentation.

Seven pathogenic strains *E.coli* o157H7, *S. aureus* As4, *S. typhimurium* As3, *S. shigae* As2, *L. monocytogenes* As1, *P. aeruginosa* Atcc27853 and *B. cereus* Dsmz 345.were used to study antibacterial activity of fermented soymilk. Results indicated that Gram-negative pathogenesis was more significantly sensitive to probiotic cultures than

gram-positive pathogenesis *E. coli* O15H7, *S. typhimirium* As3, and *Shigella shigae* As2 were more significantly sensitive to probiotic cultures which gave inhibition zone diameter (IZA) ranged from 10 to 20 mm, 12 to 16 mm, and 10 to 16 mm, respectively while *P. aeruginosa Atcc* 27853 shown the lowest (IZA) ranged from 3 mm to 8 mm.

The toxocity of fermented soymilk were tried on rats, and compared fermented soymilk (FSM) with (CY) were tried on rats for biological studies, and compare FSM with CY, results shown that no significant changes in body weight, organs weight, liver function, kidney function, lipid profile, and histopathological analysis, when compared its with control group, the antidiabetic properties were mesured, the rats were inducted with alloxan (120mg/kg), and treated with FSM, and CY, the also results shown an decrease in gloucose level , from 210 mg/dL and 207 mg/dL to 109 mg/dL and 115 mg/dL respectively, the body weight were increase in treated groups, and decrease in non treated group, Caco 2 and HT29 cancer cells were used to study the anticancer properties of FSM.

Sensory properties of FSM was determined, an improvement was shown in sensory analysis after soymilk fermentation. The affect of shelf-life (storage period) on FSM quality and properties were evoluted, during shelf-life (storage period), FSM saved its properties and qulity after 28 days of cold storage.

Finally, it could be stated that the soymilk fermented by probiotic bacterial strains had a high nutriational, health, and economic value.

Keywords: Probiotic bacteria, Fermented soymilk, Chemical composition, Antioxidant, Antibacterial, Antidiabetic, Anticancer, Shelf-life.

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