

***Studies on Utilization of Probiotic as
Functional Starter Culture for the Food
Fermentation***

By

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B.Sc. Microbiology ٢٠٠٤

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the degree of Master of Science in Microbiology

Department of Microbiology

Faculty of Science

Ain Shams University

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"رَبِّ أَوْزَعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي
أَنْعَمْتَ عَلَيَّ وَعَلَى وَالِدَيَّ وَأَنْ أَعْمَلَ
صَالِحًا تَرْضَاهُ وَأَذِلِّ لِي بِرَحْمَتِكَ فِي
مِجَادِكَ الصَّالِحِينَ"

صدق الله العظيم

"سورة النمل: الآية ١٩"

List of Abbreviations

B: Bifidobacteria

BHI: brain heart infusion

cfu: colony forming unit

CD: Crohn's disease

E: Escherichia coli

EPS: exopolysaccharide

GI: gastrointestinal

H: Helicobacter

HNCMB: Hungarian national collection of medical bacteria

h: hour

HS: horse serum

IBD: Inflammatory bowel disease

IgA: Immunoglobulin A antibody

IgE: Immunoglobulin E antibody

L: Listeria

LAB: lactic acid bacteria

Lb: Lactobacillus

LDL: low density lipoproteins

MRS: Man Rogosa Sharpe

MRSC: Man Rogosa Sharpe Cystiene

NRRL: Northern regional research laboratory

S: Staphylococcus

UBT: urease breath test

UC: Ulcerative colitis

VLDL: very low density lipoproteins

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ABSTRACT

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Probiotic characteristics of four *Lactobacillus* species (*Lb. acidophilus*, *Lb. gasseri* B-١٤١٦٨, *Lb. johnsonii* B-٢١٧٨ and *Lb. bulgaricus* Lb-١٢) and one *Bifidobacterium bifidum* Ch١ including bile tolerance, acid tolerance, antibiotic susceptibility, antimicrobial activity of culture supernatant against some pathogenic bacteria, antagonistic activity toward some pathogenic bacteria and assimilation of cholesterol from culture media were tested *Invitro*.

Results could be helpful in selecting the strains with the best probiotic characteristics for further examination to be applied in functional dairy product suitable for *Helicobacter pylori* infection treatment and in the production of a cream with low cholesterol content.

Results revealed that all of the tested strains proved to be probiotic as all the tested strains proved to be quiet resistant in the presence of ٢ % of the bile salt. All strains survived well at pH ٢,٥ after ٢h, *Lb. acidophilus* was the most tolerant strain. Antibiotic resistance test showed that , *B. bifidum* Ch١, *Lb. acidophilus* , *Lb. bulgaricus* Lb-١٢ and *Lb. gasseri* B-١٤١٦٨ were resistant to ٦ of the ١٠ antibiotics tested while *Lb. johnsonii* B-٢١٧٨ was resistant to ٥ of the ١٠ antibiotics tested.

The un-neutralized cell free spent broth of the tested strains were inhibitory to most of the tested pathogens in variable degrees, while neutralizing the cell free spent broth leads to decrease in the inhibitory effect. Additionally, probiotic strains were antagonistic towards *H. pylori* to varying degrees, *B. bifidum* Ch¹, *Lb. acidophilus*, *Lb. johnsonii* B-٢١٧٨ proved highly suppressive effect followed by *Lb. gasseri* B-١٤١٦٨.

Lb. acidophilus achieved the highest activity by removing ٦٥,١% of cholesterol from broth media, while *B. bifidum* Ch¹ showed the lowest activity ١٦,٩ %.

According to the previous results three of the tested probiotic strains which display more efficient antagonistic activity against *H. pylori* were chosen for supplementation of yogurt to detect the survival of *H. pylori* in yogurt during cold storage. The yogurt supplemented with the probiotic *B. bifidum* Ch¹ was the most suppressive followed by yogurt supplemented with *Lb. acidophilus* and then yogurt with *Lb. gasseri* B-١٤١٦٨.

Also, results of cholesterol assimilation in culture media proved that all of the five probiotic strains were able to reduce the cholesterol content, but two strains (*Lb. acidophilus* and *Lb. gasseri* B-١٤١٦٨) showed the highest cholesterol reducing effect so, they have been chosen for the production of cream with low cholesterol content.

Key words: probiotic, *Bifidobacteria*, *lactobacillus*, *H. pylori*, yogurt, cream and cholesterol.

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