IN VITRO COMPARISON OF ANTIOXIDANT ACTIVITY OF LACTIC ACID BACTERIA ISOLATED FROM HARBIN SAUSAGES AND SELECTED PROBIOTICS

Qian Chen*, Qi Han, Xiaoyu Yin and Baohua Kong

College of Food Science, Northeast Agricultural University, Harbin, Heilongjiang 150030, China

*Corresponding author email: chenqianego7@126.com

Abstract – The antioxidant activity of lactic acid bacteria (LAB) isolated from Harbin dry sausages were evaluated and compared *in vitro* with those of selected LAB from fermented dairy products. The antioxidant action of LAB varied with the cell components. Intracellular cell-free extracts of the LAB showed better inhibition of lipid peroxidation, whereas intact cells and cell-free supernatants showed better $ABTS^{\cdot+}$ scavenging ability and reducing power, respectively. Results revealed that these LAB isolated from Harbin dry sausages have strong antioxidant activity and can be used as potential antioxidants for food processing.

Key Words – Cell components, Free radical scavenging ability, Lipid peroxidation inhibition

I. INTRODUCTION

Harbin dry sausage is a traditional Chinese fermented sausage, which are popular in north-eastern China because of their unique flavour and texture. In our previous research, fermentation performance, protein hydrolysis and flavour development of lactic acid bacteria (LAB) isolated from Harbin dry sausages were evaluated. However, few studies have been reported the antioxidant potential of these LAB. The objective of this study is to evaluate the antioxidant activity of LAB isolated from Harbin dry sausages, and to compare these strains with those of LAB isolated from fermented milk products.

II. MATERIALS AND METHODS

1. Bacterial strains and culture conditions

The four species of LAB used in our study, *P. pentosaceus* R1, *L. brevis* R4, *L. curvatus* R5, and *L. fermentum* R6 were isolated from Harbin dry sausages. Six selected probiotics including *L. acidophilus*, *L. plantarum*, *L. curvatus*, *L. sake*, *L. pentosaceus*, and *L. fermentum* isolated from fermented dairy products were used for comparison with these four LAB.

2. Lipid peroxidation inhibition activity of LAB in a liposome system

Inhibition of lipid peroxidation by LAB was detected by the 2-thiobarbituric acid (TBA) method according to Kong *et al* [1].

3. Scavenging of $ABTS^{\cdot+}$ radical

The scavenging of $ABTS^{\cdot+}$ radical was measured by the method according to Jia *et al* [2].

4. Reducing power

The reducing power of LAB was tested by the ferric reducing/antioxidant power (FRAP) method according to Kleniewska *et al* [3].

5. Statistical analysis

Data were shown as mean ± standard error (SE) and analyzed by the General Linear Models procedure of Statistix 8.1 (Analytical Software, USA). One-way analysis of variance and Tukey's multiple comparison were used to test the significant differences ($P < 0.05$) of means of all LAB.

III. RESULTS AND DISCUSSION

1. Inhibition of lipid peroxidation i*n vitro*

The rates of inhibition by intracellular cell-free extracts were significantly higher than those of intact cells and cell-free supernatants ($P < 0.05$). For intracellular cell-free extracts, the rates of lipid peroxidation inhibition of all LAB were over 30%. With cell-free supernatants, the inhibition rates ranged from 11.4% for *L. curvatus* R5 to 16.8% for *L. fermentum* R6, and the values of all strains were less than 20%.

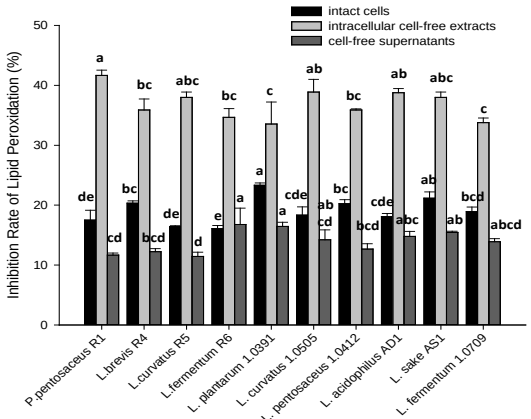

Figure 1. Rate of lipid peroxidation inhibition (%)of lactic acid bacteria (LAB).

3. $ABTS^{\cdot+}$ radical scavenging activity

The $ABTS^{\cdot+}$ scavenging rates of intact cells were significantly higher than those of intracellular cell-free extracts and cell-free supernatants, and these rates were strain-dependent ($P < 0.05$). The intact cells of *P. pentosaceus* R1, *L. plantarum*, and *L. sake* showed the highest $ABTS^{\cdot+}$ scavenging rates.

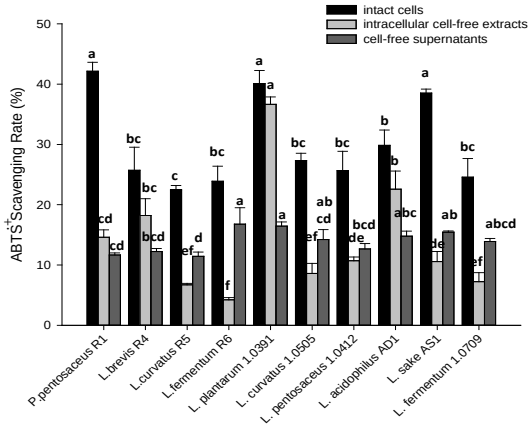

Figure 2. $ABTS^{\cdot+}$ free radical scavenging activity (%) of lactic acid bacteria (LAB).

3. Reducing power

For nine of the 10 strains tested (all except for *L. fermentum*), the values for cell-free supernatants were higher than those for the intracellular cell-free extracts and intact cells ($P < 0.05$). The reducing activities of cell-free supernatants of all of the strains isolated from Harbin dry sausages were over 1.4 mM.

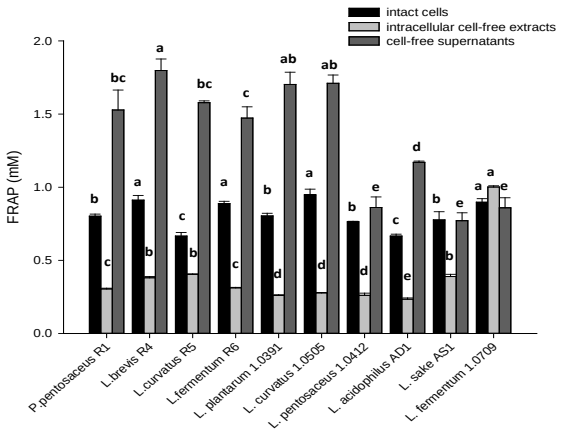

Figure 3. Ferric reducing/antioxidant power (FRAP) (mM) of lactic acid bacteria (LAB).

IV. CONCLUSION

The results of the *in vitro* antioxidant activity assay showed that the modes of antioxidant action varied by cell component. Intact cells, intracellular cell-free extracts, and cell-free supernatants exhibited the best $ABTS^{\cdot+}$ scavenging activity, lipid peroxidation inhibition activity, and reducing power, respectively. All of LAB isolated from Harbin dry sausages expressed well antioxidant activity.

ACKNOWLEDGEMENTS

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