

THE PREVALENCE OF LACTIC ACID BACTERIA AS PROBIOTIC IN MALAYSIAN FERMENTED FOOD PRODUCTS: A REVIEW

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Abstract: Ingestion of probiotics products have been associated with a variety of health advantages and are beneficial to the gut. The most common types of probiotics employed for their beneficial properties are lactic acid bacteria (LAB) which are typically found in fermented food. In Malaysian fermented foods, LAB is already being used especially in non-dairy fermented foods. However, these fermented food products are usually prepared on a small scale which might be exposed to microbial contamination. Numerous research has been conducted to isolate LAB from several varieties of Malaysian fermented food in order to find the ideal strain to use as starter culture. Hence, the review of LAB in Malaysian fermented food products was conducted to identify which fermented food products can be classified as probiotic. For this, studies published and indexed in Google scholar between 2016-2020 were manually searched and analysed. The study includes products from different food groups which are fish, seafood, legumes, vegetables and fruits. This review also highlights the parameter of probiotics screening and the benefits of probiotics in fermented food. Malaysian fermented food products were identified to be a good potential probiotics property with *Lactobacillus* spp. was found in most of the fermented products. *Lactobacillus* spp. can survive the human digestive tract and shows antimicrobial effects towards pathogenic bacteria. Hence, Malaysian fermented foods that are cheap and abundant may be a good alternative for foods with potential probiotics and thus can be considered as functional foods.

Keywords: Probiotic, lactic acid bacteria, fermented food

1. Introduction

Probiotics are living microorganisms, generally beneficial bacteria or yeasts, which can be provided in sufficient quantities to aid the host's health. The probiotic's enzymatic action will alter the constituents of food in a way that benefits the gastrointestinal system. Lactic acid bacteria (LAB), which are commonly found in fermented foods, particularly dairy products, are the most common forms of probiotics used by the food industry for their beneficial qualities (Peng et al., 2020).

LABs are among the most beneficial probiotics because they can enter via food to the host body, persist in the acidic environment of the stomach and then colonise the gut, where the bacteria may produce lactic acid and other necessary nutrients when converting carbohydrate. One of the advantages related to lactic acid produced by LABs is that it lowers the pH level in the host's gut which can hinder the pathogenic microorganism's growth and survival (Peng et al., 2020). Because of a greater knowledge of the role of these bacteria in protecting the host's health, there has been a significant increase in the production of probiotic bacteria-containing products.



However, two main issues related to fermented dairy products are lactose intolerance and the cholesterol content of milk. These are compelling reasons to study the role of non-dairy products in supporting probiotics. In many Asian fermented foods, LAB is already being used especially in non-dairy fermented products like vegetables, fish and meat (Muryany, Salwany, Ghazali, Hing, & Fadilah, 2017). These fermented foods have been devoured for thousands of years before any clear health benefits became truly understood. Numerous researches have been conducted to isolate LAB from several varieties of Malaysian traditional foods. Hence, the data from previous study on lactic acid bacteria in fermented food will be extracted and presented in this paper. Thus, helping other researchers or industry in commercial production of non-dairy probiotic products.

2. Discussion

2.1. Parameter of probiotic screening

Probiotics strains' health effects are mostly determined by their capacity in order to make it through the upper GI, colonise and proliferate in the host intestine. Probiotic bacteria's metabolic products or cell components also should not have or create any pathogenic, toxic, mutagenic or carcinogenic impacts on the host. There are several phases that can have an impact on the viability and survival of probiotic bacteria.

Firstly, bacteria must survive the acidic environment of the stomach. The pH of hydrochloric acid in the human stomach during digestion fluctuates from 1.5 to 4.5, depending on the eating intervals or the variety of the food. Hence, survival at pH 3 is critical since intake with food elevates the pH in the stomach to 3 or higher. Bile produced in the small intestine, is known to decrease bacterial viability by disrupting cell membranes. Hence, 0.3% of bile salts is considered essential and sufficient to screen for resistant strains (Muryany et al., 2017).

One of the more significant selection criteria for probiotics LAB is the ability to adhere to the intestinal mucosa because adhesion to the intestinal mucosa is thought to be a requirement for colonisation to have a positive effect on the host. Then lastly, the ability of an isolate to inhibit or prevent the development of bacterial pathogens. Probiotics must be able to interact directly with disease-causing microorganisms in order to boost the immune system and aid in disease prevention in the gut (Muryany et al., 2017). LAB generates peptides and bacteriocin with inhibitory characteristics that can stop pathogenic bacteria from growing.

2.2. Probiotic potential in Malaysian fermented food products

Malaysia produces a wide range of fermented food, including fish, vegetables, seafood, legumes, fruits, and many more. The study by Muryany et al. (2017) shows that only three pure isolates from fermented fish have probiotic characteristics and further study shows that the three isolates have good adhesion and colonisation on intestinal cells.

The study by Harnentis et al. (2020) demonstrates that LAB isolated from Tapai and Budu can withstand bile salt with a resistance of >30% and also have >84% hydrophobicity ability in the intestines. The study by Tengku Abdul Hamid and Fatin Amysya (2020) also has been done on fermented cassava together with Belacan and found that the majority of these isolates exhibiting broad spectrum inhibition of pathogenic bacteria.

The results from the Novarina, Dinoto, Julistiono, Handayani, and Saputra (2020) indicate that bacteria isolated from tempeh met the standard for probiotic candidate, which include the ability



to produce antimicrobial activity, and the ability to be exposed to simulated gastric juice, bile salt, and stimulated intestinal juice. Next, a study revealed that pickled ‘maman’, pickled mustard, pickled bitter bean and pickled carrot have a strong antagonistic activity of LAB isolates against the pathogenic strains.

Lasly, the recent study by Khalil, Abd Manap, Mustafa, Alhelli, and Shokryazdan (2018) investigated potential probiotic properties of seven *Lactobacillus* strains isolated from tempoyak. The findings revealed that all the strains were extremely resistant to the low pH 3.0, 0.3% percent bile salts and the in vitro model of gastrointestinal conditions which shows a good potential of probiotics.

2.3. Benefits of probiotics in fermented food products

Probiotics have been recommended as a treatment for numerous health conditions such as lactose intolerance, colon cancer, rheumatoid arthritis, Crohn’s disease, food allergies and reducing the duration of acute infectious diarrhoea in babies and children. LAB-containing probiotics can also be utilised to enhance intestinal barrier function, therefore avoiding infection and inflammation (Evivie, Huo, Igene, & Bian, 2017).

Tempkeh has been shown in the literature to be effective in treating diarrhoea in monogastric mammals. Tempkeh’s anti-diarrheal effects may be connected to its antibacterial characteristics. Moreover, several research investigating the anti-diabetic benefits of LAB have been published in past years.

Obesity has been linked to intestinal environmental variables in both humans and mice. It has been reported that the consumption of *L. gasseri* SBT2055 decreased body weight, BMI, abdominal adiposity and hip circumference.

3. Conclusion

Hence, it can be seen that from previous study there are some Malaysian fermented food products that have probiotic and *Lactobacillus spp* especially *Lactobacillus plantarum* is present in most Malaysian fermented food. Comprehensive study should be done to collect sufficient data on humans to provide information to Malaysian consumers so they will have better understanding towards our foods.

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