

## Characteristics of Physicochemistry, Microbiology and Antibacterial Activities from Fermentation of Viscera Fish Sauce

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The key toxicokinetic processes are absorption, distribution, metabolism, and excretion. The focus here is on the influence of physicochemical properties on the rate of absorption of a chemical into the bloodstream, its distribution to the organs and tissues, and its rate of elimination (clearance) of a compound. The fermentation process produced a single amino acid and peptide through a process of protein hydrolysis involved lactic acid bacteria as antibacterial activity

High demand for tuna products both in fresh and processed conditions caused an increase in waste or byproducts in form of head, skin, stomach contents, bones, fins and red meat parts. About 20-30% of fish production was around 6.5 million tons per year as waste. This means that 2 million tons are wasted as waste, which should be utilized. The process of preserving and processing fish generally results in altered waste viscera which is a source of fat and protein.

This study aims to determine the physical and chemical characteristics, total lactic acid bacteria and antibacterial activity of tuna viscera sauce. The research results showed physicochemical characteristics including color ( $L^*$  8.3,  $a^*$  1.3 and  $b^*$  5.7), viscosity of 10.38 cP, pH 5.00, salt content of 13.21%, total acid 0.74% and TVBN 28.00 mgN/gr) Proximate analysis were also identified, resulting in moisture 62.87%, ash 1.37%, protein 23.18% and carbohydrate 0.42%. The total lactic acid bacteria and total plate count respectively were 2.3 log CFU/gr and  $2.3 \times 10^1$  CFU/gr. The results of the antibacterial activity tested on three pathogenic bacteria, *Vibrio parahaemolyticus*, *Salmonella typhimurium*, and *Escherichia coli*, showed inhibition with the presence of clear zones.

This study displayed for the first time the

dynamic changes of the bacterial community during the fermentation of traditional Chinese fish sauce (TCFS) using high-throughput sequencing. In the first phase of TCFS fermentation, *Shewanella* (approximately 90%) within Proteobacteria was the dominant bacteria. Then, *Halanaerobium* (3%–86%) within Firmicutes rapidly replaced *Shewanella* as the dominant genus until the 12th month. *Lactococcus* (3.31%) and *Bacillus* (45.56%) belonging to Firmicutes are identified abundantly in the 3rd and 9th months after fermentation, respectively. In the final stage (12–15 months), *Tetragenococcus* within Firmicutes replaced *Halanaerobium* as the most dominant bacteria (29.54%)

The waste can actually be utilized, one of the contents of the stomach (viscera) can be made into fish sauce. Fish sauce is one of the processed food products through a fermentation process made from fish meat and fish byproducts in the form of viscera, has a distinctive taste and smell and a long shelf life. Fish sauce can be made in three ways, namely by enzymatic, chemical and fermentation processes spontaneously. However, the characteristics of fish sauce produced by Tuna have not been widely known, nor has there been information about physicochemical characteristics. In addition, during the fermentation process lactic acid bacteria can hydrolyze proteins into peptides that have antibacterial activity.

Color test used a color reader (Minolta CR-10), whereas, Viscosity used a viscometer (Elcometer 2300). (Wenno et al., 2016). pH and acidity, salinity, Proximate (AOAC, 2005), Lactic Acid Bacteria (LAB) (Yin et al., 2002), TPC (Firdaus, 1993) and antibacterial Activity (Wang et al., 2008). Fermented sauces produce bioactive peptides which have

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antibacterial activity and a number of nutritional components that are beneficial to health.

The physicochemical characteristics of tuna viscera sauce The results of the study showed physicochemical characteristics including calor ( $L^*$  8.3,  $a^*$  1.3 and  $b^*$  5.7), viscosity of 10.38 cP, pH 5.00, salt content of 13.21%, total acid 0.74 and TVBN 28.00 mgN/gr), the proximate was 62,87 moisture, 12,16 ash, 23,18 fat, 1,37 protein and 0,42 carbohydrate. The total lactic acid bacteria and total plate count was 2.3 log cfu/gr and  $2,3 \times 10^1$  cfu/ gr. The antibacterial activity of isolated tuna viscera sauce on 3 test bacteria (*Vibrio parahaemolyticus*, *Salmonella typhimurium* and *Escherichia coli*) showed inhibitory activity (clear zone) with different inhibition diameters.