

Effect of Synbiotics on Rats' Intestinal Microbiota

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Abstract : The present study was conducted to identify the effects of synbiotics composed of lactic acid (LA) bacteria (LAB) and sea tangle on rat's intestinal microorganisms and anti-obesity effects. The experiment was conducted for six weeks using an 8-week old male rat as experiment animals and the experimental design was to use six treatments groups of 4 repetitions using three mice per repetition. The treatment groups were organized into a normal fat diet control (NFC), a high fat (HF) diet control (HFC), a prebiotic 0% treatment (HF+LA+sea tangle 0%, ST0), a prebiotic 5% treatment (HF+LA+sea tangle 5%, ST5), a prebiotic 10% treatment (HF+LA+sea tangle 10%, ST10), and a prebiotic 15% treatment group (HF+LA+sea tangle 15%, ST15) to conduct experiments with various levels of prebiotics. According to the results of the experiment, the NFC group showed the highest daily weight gain (22.34g) and the ST0 group showed the lowest daily weight gain (19.41g). However, weight gains during the entire experimental period were the highest in the HFC group (475.73g) and the lowest in the ST0 group (454.23g). Feed efficiency was the highest in the HFC group (0.20). Treatment with synbiotics composed of LAB and sea tangle suppressed weight increases due to HF diet and reduced feed efficiency. Intestinal microorganisms were identified through pyrosequencing and according to the results, Firmicutes phylum (approximately 60%) and Bacteroidetes phylum (approximately 30%) accounted for approximately 90% or more of intestinal microorganisms in all of the treatment groups indicating these bacteria are dominating in the intestines. Firmicutes that is related to weight increases accounted for 64.96% of microorganisms in the NFC group, 75.32% in the HFC group, 59.51% in the ST0 group, 61.29% in the ST5 group, 49.91% in the ST10 group, and 39.65% in the ST15 group. Therefore, Firmicutes showed the highest share the HFC group that showed high weight gains and the lowest share in the group treated with mixed synbiotics composed of LAB and sea tangle. Bacteroidetes that is related to weight gain inhibition accounted for 32.12% of microorganisms in the NFC group, and HFC group 21.57%, ST0 group 37.66%, ST5 group 34.92%, ST10 group 44.46%, and ST15 group 53.22%. Therefore, the share of Bacteroidetes was the lowest in the HFC group with no addition of synbiotics and increased along with the level of treatment with synbiotics. Changes in blood components were not significantly different among the groups and SCFA yields were shown to be higher in groups treated with synbiotics than in groups not added with synbiotics. Through the present study, it was shown that the supply of synbiotics composed of LAB and sea tangle increased feed intake but led to weight losses and that the intake of synbiotics composed of LAB and sea tangle had anti-obesity effects due to decreases in Firmicutes which are microorganisms related to weight gains and increases in Bacteroidetes which are microorganisms related to weight losses. Therefore, synbiotics composed of LAB and sea tangle are considered to have the effect to prevent metabolic disorders in the rat.

Keywords : bacteroidetes, firmicutes, intestinal microbiota, lactic acid, sea tangle, synbiotics

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