Thesis **Effect of Prolonged Consumption of Yoghurt on Lactose Digestion and Tolerance in Adolescents**

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Abstract

Milk is the main source of calcium and high quality protein and other nutrients. Lactose is the unique disaccharide in milk. It requires hydrolysis by a brush-border enzyme β-galactosidase or lactase before absorption. High level of the enzyme occurs in most of infants. Similar to the majority of the world's population, studies from the last three decades reported high incidence of Thai children and adults who experience permanent loss of most intestinal lactase and suffer from gastrointestinal symptoms. Previous studies in Thailand explored several means to reduce the undesirable symptoms when milk is consumed, for example, reducing of milk volume at a time, having milk after meal and drinking milk with solid foods. Various degrees of improvement were recorded. Having fermented milk in the form of yoghurt was tried in one experiment in adults. However, lactose digestion and tolerance in Thai adolescents and the period effect of yoghurt consumption have not yet been performed. They were, therefore, the objectives of this study. Non-invasive quantitative measurement of hydrogen in breath was applied as a means to indicate the degree of lactose maldigestion and the gastrointestinal symptoms occurring after drinking milk or having yoghurt was used as a means to indicate lactose intolerance. In addition, the chemical and microbiological changes in yoghurt during the storage in the refrigerator for 4 weeks were conducted.

Lactose maldigestion and intolerance were studied in 110 Thai adolescents, from Mahidolvithayanusorn School, aged 14-16 years, using 250 ml milk as the tested

diet. Among these subjects, 41% were lactose maldigesters with 30% being lactose-intolerant maldigesters. However, in 59% of lactose digesters, 10% were lactose-intolerant digesters. Thirty one volunteers of lactose maldigesters were divided into 2 groups. Each consumed 250 g yoghurt with or without *Bifidobacterium bifidus* for 1, 7 and 14 days. Based on breath hydrogen production, digestion of lactose in 250 g yoghurt was significantly ($p<0.05$) better than that in 250 ml milk, and no significant ($p>0.05$) difference was found among different types of yoghurt. The better digestion is likely due to β-galactosidase in the culture organisms and the effect of semi-solid of yoghurt as well as individual residual lactase activity. In total, 77% of the subjects produced half in total breath hydrogen when consumed yoghurt compare to milk but only 58% of the subjects were classified as good respondents - those who produced one-third or less in total breath hydrogen. Number of lactose intolerance and the intensity of symptoms decreased after ingestion of yoghurt. The difference of the individual residual lactase activity would be the main reason to explain the good and poor respondents. After having yoghurt for 7 days, only poor respondents were tested for lactose digestibility on day 7, 45% of them became good respondents. Prolonged effect of 14 days yoghurt consumption in poor respondents was not found. The residual lactose content in aged-yoghurt and the individual lactase activity seem to be the factors changing poor to good respondents. Effect of yoghurt consumption for 7 and 14 days on lactose digestibility in good respondents was tested, using 250 ml milk as the tested diet. Significantly ($p< 0.05$) lower breath hydrogen production was found only in the period of 14 days yoghurt consumption compared to without having yoghurt period. In addition, number of subjects and intensity of intolerance decreased in relation to prolonged period of yoghurt consumption. Prolonged consumption of yoghurt for 14 days had an effect on lactose digestion, changing few lactose maldigesters to lactose digesters. The effect was found not sustainable and did not appear on the 3rd day after cessation of yoghurt period. Temporary changing of intestinal microflora due to prolonged consumption of yoghurt might be the reason. Yoghurt containing *B. bifidus*, in addition to bacterial yoghurt, had no desirable effect over the common bacterial yoghurt. Microorganisms and sugar content in yoghurt decreased while the titratable acidity increased during storage in the refrigerator for 4 weeks.