Effect of fortification of cocoa (*Theobroma cacao* L.) to probiotic yoghurt on lipoprotein profile in hypercholestreolemia rats

Nenden Indrayati Anggraeni¹*, Lovita Andriani², Gaka Irawan Nugraha³

¹Department of Chemistry, Faculty of Mathematics and Natural Sciences
²Department of Biochemistry, Faculty of Animal Husbandry
³Department of Nutrition, Faculty of Medicine
Jl. Raya Jatinangor Km 21 Sumedang, West Java, Indonesia
*Corresponding author: nenden.indrayati@unpad.ac.id

Abstract

Cocoa (*Theobroma cacao* L.) has rich polyphenol flavonoid such as catechins that can prevent cardiovascular disease through its antioxidant effect. Cocoa can be consumed by fortification cocoa into probiotic yoghurt. The method of this research is laboratory analytic experimental study. The experiment is to determine profile lipoprotein concentration by using Lieberman Burchard spectrophotometer via polyethylene glycol method. The subjects used are 35 male Wistar male rats which divided into 7 groups, each group consist of 5 male rats. Group I is the negative control group, group II is the positive control group, group III is probiotic yoghurt, group IV is cocoa 0.50 g and group V, VI and VII are the treatment group which are given 0.38 g, 0.50 g and 0.75 g of cocoa fortified to probiotic yoghurt respectively. The entire group was induced with high cholesterol diet for 4 weeks except for group I. The treatments were given for 4 weeks together with high cholesterol diet. The result showed significant effect in group I (normal rats), group III, group IV, group V, group VI, and group VII with p-value of 0.54, 0.53, 0.15, 0.87, 0.56 and 0.09, respectively. Group II (high-fat diet rats) shows significant effect with p-value 0.05. The conclusion showed that fortification cocoa to probiotic yoghurt has effect on profile lipoprotein level in rats after 4 weeks of the experiment.

Keywords: *Theobroma cacao* L., probiotic yoghurt, profile lipoprotein, total cholesterol.

Introduction

Food fortification is usually regarded as the deliberate addition of one or more micronutrients to particular foods, so as to increase the intake of these micronutrient(s) in order to correct or prevent a demonstrated deficiency and provide a health benefit. Cocoa fortified with nine iron compounds commonly used for food fortification and with ferrilophosphate and ferrilophosphate-whey protein complex were evaluated for changes in colour and flavour (Baroutkoub et al., 2010). Cocoa can undergo fortification process to add into other food like probiotic yogurt.

Probiotics are microorganisms which when administered in adequate amounts, it confer a beneficial health effect on the host. For examples are *Lactobacillus* and *Bifidobacterium* genera. These microorganisms do not promote or cause disease. They comprise multiple species and subspecies of bacteria, as well as one species of yeast, *Saccharomyces* (Ataie-Jafari et al., 2009).

Probiotic yogurt is basically yogurt with live and active cultures. It can promote and maximize digestion of certain nutrients in the body. It is effective in peptic ulcers associated with *Helicobacter pylori* (Fuller, 1992). Probiotic yogurt has some other benefits such as decreasing blood cholesterol levels (Osakabe & Yamagishi 2007). Other unproven benefits of probiotic yogurt include aiding in lactose intolerance, preventing cancer, asthma and allergy prevention, preventing infections, reducing cholesterol, and relieving irritable bowel syndrome (Baba et al., 2007).

Hypercholesterolemia is the common disease nowadays and it is one of the risk factor for cardiovascular disease. Cardiovascular disease caused over 18 million deaths in the world in 2005. Of these deaths, eight million (44%) occurred in people under 60 years of age and 80% took place in low- and middle income countries. In response, the World Health Organization (WHO) has set a goal of reducing the global rate of death from chronic diseases by 2% a year through 2015 (Baroutkoub et al., 2010). This goal rests on the recognition that throughout the world deaths from cardiovascular causes are attributable to a few modifiable risk factors, most importantly high blood pressure, smoking and high total serum cholesterol which is hypercholesterolemia (Ataie-Jafari et al., 2009).

The beneficial effect of reducing total plasma cholesterol in patients with hypercholesterolemia is incontrovertible. Lifestyle changes such as exercising, eating a healthy diet or food intervention and cholesterol lowering agents are among the treatments recommended for them (Fuller, 1992).