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In Vivo Study on Albumin and Total Protein in White Rat *(Rattus norvegicus)* after Feeding of Enteral Formula from Tempe and Local Food

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Abstract

Enteral nutrition is used to supply the needs of nutrition and supplement for malnutrition patient. In certain condition, enteral was given in liquid form. Local food, such as tempe, rice, mung bean and canna suitable for being used in enteral formula. This study was conducted to determine effect of feeding enteral nutrition from tempe and local food using in vivo study on body weight, albumin and total protein. Rats were divided into three groups : Groups A were fed gogik (dried cassava, negative control), group B were fed enteral nutrition from local food (tempe, rice, mung bean, canna) and group C were fed commercial enteral nutrition. Before feeding, all of rat were fed gogik (dried cassava) during 14 days. Enteral nutrition was fed 20 gr/day during 30 days and consumption was recorded every day. Whole blood was collected from sinus orbitalis for analysis of total protein and albumin. Observation on body weight, albumin and total protein were made on day 0, 15 and 30. The result showed that body weight and albumin group B (enteral nutrition from tempe and local food) and group C (commercial enteral nutrition) were increased and group A (negative control) was decreased. The highest weight gain was by group B. Total protein on group B (4,63 g/dl) was higher compared to group C (4,48 g/dl) and group A (1,19 g/dl). This result showed that enteral nutrition from tempe and local foods was better than commercial formula.

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Key words: in vivo, enteral nutrition, local food, body weight, total protein, albumin

Introduction

Malnutrition in hospital patients, especially in hospitalized patients was common nutritional problem. Various studies have shown that the high prevalence of malnutrition in

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hospitals not only in developing countries but also developed countries, Such as in the Netherlands 40%, Sweden 17% -47%, Denmark 28%, America and Britain 40% - 50% [1][2]. Prevalence of malnutrition in hospitals was increase and from the average nutritional status of patients who were hospitalized decreased 75% compared to the nutritional status nutritional status of the current hospital admission [3]. The incidence of hospital malnutrition was 40-55% with 12% of them with severe malnutrition [4]. The risk of malnutrition's affect were healing time will be longer, extending the length of hospitalization (hospitalization period of patients with malnutrition 90 times longer compared with patients with good nutrition), adds to hospital costs, and generally elevating patient morbidity and mortality [5][6].

Efforts were made to maintain and improve the nutritional status of patients with the adequate and optimal nutrition using enteral [7]. Enteral was given orally or by tube to the patiens as long as the gastrointestinal system still work properly. Study was conducted to develop enteral formula from local food, such as tempe, green beans, rice, and canna. Nutrition from this formula contain energy 401 cal; protein 16,32 %; fat 9,49 %; and mineral Ca, mg, Na, K, P 0,24 %; 0,03 %; 0,12 %; 0,16 %; and 0,14 % respectively [8]. Enteral feeding using local food in rats is able to provide a good influence on the structure of the epithelial cells of the intestinal mucosa [9].

The study describes the effect of enteral feeding from local food compared with commercial to the condition of body weight, levels of albumin, total plasma protein in rats *(Rattus norvegicus)*.

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Material and Method

Eighteen Male Wistar rats (2 months) were obtained from Integrated Research and Testing Laboratory (LPPT UGM). Rats were individually housed in stainless cages in a room with a 12-h light cycle and were allowed free access to food and water throughout the study. Rats were divided into three groups: Group A were fed "gogik" (dried cassava, as negative control), Group B were fed enteral nutrition from local food (tempe, rice, mung bean, canna), and Group C were fed commercial enteral nutrition. Before study, all of rats were fed "gogik" (dried cassava) during 14 days. Enteral nutrition was fed 20 gr/day during 30 days and consumption was recorded every day. Whole blood was collected from sinus orbitalis for analysis of total protein and albumin. Observation on body weight, albumin and total protein were made on day 0, 15 and 30. Animal live weight and food consumption were determined during the Study. Whole blood was collected from sinus orbitalis for Albumine and total

protein in day study 0, 15 and 30. Albumin was measured using kit dari DiaSys. All values are analysed using expressed as means standard deviations. Differences were evaluated using one-way analysis of variance (ANAVA) followed by *Duncan Multiple Range Test* and differences were considered statistically significant at $P < 0,05$

Results and Discussion

Weight is often used to measure nutritional status because it is strongly influenced by the changes of food and nutrient conditions. It will go down with decreasing food and nutrient intake [10], and at the time of food intake and nutritional conditions fulfilled, the weight will increase to normal weight.

Weight measurement results show that the weight of malnutrition white rats *(R. norvegicus)* increased by administration of enteral formula (Figure 1). Highest weight gain was 82.33 grams (group B), whereas the treatment group C (commercial formula) 70.17 gram. For rats whose condition remains severe malnutrition decreased to 29.83 grams.

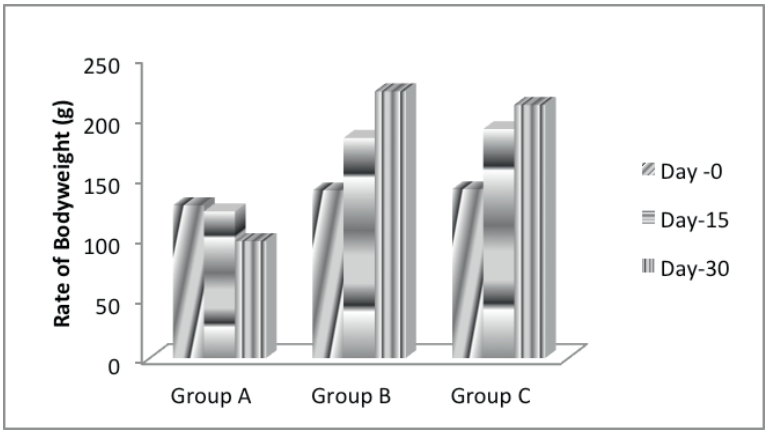

Figure 1. weight of rats *(Rattus norvegicus)* before and after enteral feeding with a different formula for 30 days

Increase in weight is influenced by differences in the composition of the feed and therefore contributes to nutrient intake. Feed composition affect the optimization of the digestibility and absorption of nutrients in the body [9]. Food consumption have a strong and visible impact on weight gain [11][12].

ANAVA test results showed that the differences in enteral feeding formula significantly affect the weight gain of white rats malnourished ($p < 0,05$). Results DMRT at 5% significance level showed significant difference in all treatment groups . It can be seen

that enteral formula from tempe and local food gives more influence in weight gain when compared with commercial enteral formula.

Albumin and total protein

Total protein plasma used as parameter for total protein in body. Its contain albumin, globulin and fibrinogen. albumin has the greatest composition in the plasma (more than 50%). Sixty percent albumin were extravascular space and will be mobilized in the event of a decrease in the protein content of the blood. Levels of albumin in protein plasma associated with deposits in the body. It has large deposits of excreta synthesis in the liver, so decrease in albumin levels can be used as an indication of protein deficiency in the body and sign of malnutrition. Increase or decrease in albumin levels are influenced by protein intake into the body, protein digestion or absorption of adequate or inadequate, and disease [13].

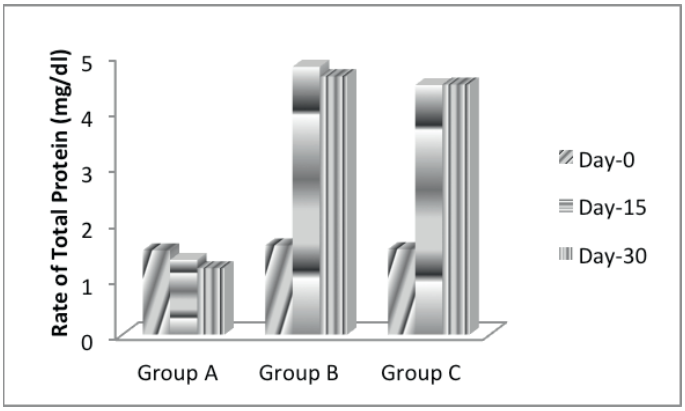

Figure 2. Rate of total protein in rats *(Rattus norvegicus)* after enteral feeding with a different formula for 30 days

Measurement of total protein in malnutrition white rat *(R. norvegicus)* after administration of different enteral feeding formula on day 0, day 15 and day 30 can be seen in Figure 2. The mean levels of total protein of white rats *(R norvegicus)* Group B (4,63 g/dl) is higher compared to Group C (4,48 g/dl), whereas Group A has continued to decline (1,19 g/dl).

Albumin levels increase at the end of treatment in Group B and Group C, whereas Group A (negative control) decreased albumin is still ongoing (Fig. 3). This is due to the low nutritional value of the feed in Group C which the protein content of only 2.56 g [14]. Thus it can be said that the difference in the composition of enteral feeding in each treatment group have different effects on levels of rat albumin.

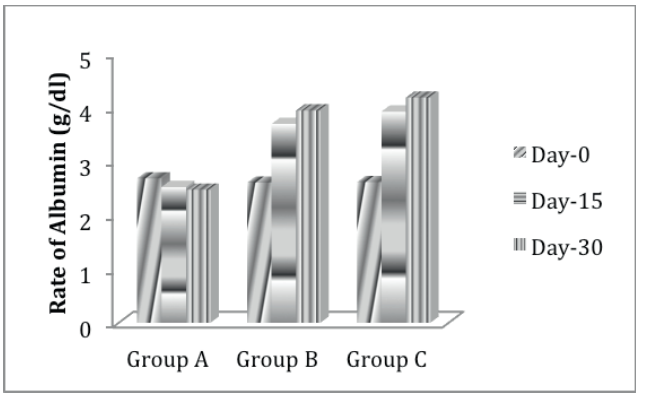

Figure 3. Rate of Albumin in rats *(Rattus norvegicus)* after enteral feeding with a different formula for 30 days

Normal levels of albumin in male rat was 3.0 to 5.1 g / dL. Treatment of enteral feeding in the malnutrition rat *(R. norvegicus)* during 30 days of treatment increase albumin levels normalized in all treatment groups. Digestibility of the protein increase as more variety of food added, so it will increase the number of amino acids that are absorbed by the body. This is important, because amino acids can be absorbed by the body, then the utilization of amino acids in the protein are also maximum, it will be able to increase the levels of albumin in the blood..

Conclusion

Enteral formula from local food (tempe, rice, mung bean, canna) increasing body weight, total protein higher than commercial enteral nutrition and negative control on malnourished white rat. Therefore, this result showed that enteral formula from local food was better than commercial formula.

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