

## RELATIONSHIP OF NUTRITIONAL STATUS WITH DEGREE AND TYPE OF ANEMIA IN VEGETARIAN

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### ABSTRACT

**Introduction:** A vegetarian that consumes only plant foods is at risk for anemia due to nutritional deficiencies, especially iron and vitamin B<sub>12</sub>.

**Aim :** to identify the level of nutritional intake, nutritional status, degree of anemia and type of anemia in a vegetarian group and to analyze the relationship between nutritional status with degree and type of anemia.

**Method :** This study used analytic research, with correlational study, through *cross sectional* approach. The sampling technique of this research was purposive sampling at Vihara Thien Bao (Maha Vihara) with sample of 38 people including inclusion and exclusion criteria. Data were analyzed by using Rank Spearman test to measure the correlational relationship between nutritional status with degree of anemia and the contingency coefficient test measure the correlational relationship between nutritional status with type of anemia.

**Result :** Intake of energy (71.89%), carbohydrate (74.56%), fat (68.04%), protein (134.38%), vitamin B<sub>12</sub> (98.83%) and iron (25,04%) for men. Intake of energy (65,42%), carbohydrate (69,21%), fat (63,94%), protein (100,48%), vitamin B<sub>12</sub> (45,30%) and iron (27,67%) for women. These data were compared with RDA. P value for nutritional status correlation analysis with degree of anemia was 0,639 and p value for nutritional status correlation analysis with type of anemia was 0,851.

**Conclusion :** There was a deficit of energy, carbohydrate, fat, and iron in both gender. Protein intake was excessive in man and normal in woman. Iron and vitamin B<sub>12</sub> intake were adequate in man and deficient in woman. Energy intake was deficient in man and very deficient in women. The nutritional intake was less likely cause anemia. There was no correlation between nutritional status with degree and type of anemia

**Keywords:** Nutrition Status, Anemia, Vegetarian, Nutritional Intake.

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## INTRODUCTION

Vegetarian diet shows a rapid increase every year. This has been seen in the increased amount of vegetarian populations in the world. Approximately, on December 2012, there are 2000 people in Indonesia Vegetarian Society in Surabaya.<sup>(1)</sup>

Some studies shows that vegetarians have relatively lower Body Mass Index (BMI) compared to non vegetarians. This happen because vegetarian diet's food intake is lower in saturated fat, cholestrol, and higher in fiber such as fruiets and vegetables.<sup>(2,3)</sup>

A study by Yani et al., shows that out of 30 vegetarians there are 20 people with normal Hb rate (66,6%) and 10 people with Hb rate below normal (33,7%). This results because some vegetarians consume non heme iron foods originated from vegetables and there are calcium, phospate, bran, phytic acid and polyphenol.<sup>(4)</sup> A research done in Semarang shows that the adequacy of vitamin B<sub>12</sub> and iron intake in vegetarians are 80,4% and 47,1%, which was categorized as inadequate. 85,4% vegetarians who don't consume supplements are lacking in vitamin B<sub>12</sub>.

Iron which comes from red meat are iron that is easily absorbed. Less iron in vegetables can be absorbed in the body.

Therefore, vegetarians who consume plant based foods are struggling in obtaining iron. Iron used in haemoglobin formation (Hb). Lack of Hb can cause anemia.<sup>(6)</sup> Vegetables contains phytic compound and oxalate that inhibit non heme iron. Lack of iron can cause iron deficiency anemia, which is a main nutritional problem in Indonesia.<sup>(5)</sup>

Vitamin B<sub>12</sub> mostly found in animal source foods including red meats, poultries, seafoods, milk, cheese, and eggs. Vitamin B<sub>12</sub> produced by bacterias in colon, while plant-based food generally doesn't have vitamin B<sub>12</sub> sources.. Therefore, nutritions for vegetarians, especially those who choose full plant-based diet must pay attention to vitamin B<sub>12</sub> level.<sup>(6)</sup> Megaloblastic anemia caused by vitamin B<sub>12</sub> deficiency and folate acid.<sup>(7)</sup>

Based on the facts explained above, it is known that vegetarians has a lower nutritional intake such as lack of vitamin B<sub>12</sub> and iron that can be absorbed which makes vegetarians most likely to have anemia.. Therefore, this research aim to see the relationship of nutritional status with degree and type of anemia in vegetarian in Vihara Thien Bao.

## METHODS

This study used analytic research, with correlational study, through *cross sectional* approach.

The number of sample obtained in this study is 38 people. Inclusion criteria was people who has been a vegan for more than 1 year, not pregnant, aged above 19 and below 64 years old and willing to fill inform consent. Exclusion criteria in this study is people who has been vegan for less than 1 year, suffering from G6PD, kidney failure, hypermenorrhea, and thalassemia.

This study started on July 9<sup>th</sup>, 2017 with 2 days of data retrieval not in a row with interview on the first day and 2<sup>nd</sup> day. This study used the questionnaire interview 24 food recall, BMI and complete blood test using Sysmex. Data from interview and measurement will be entered in nutrisurvey program and *Statistical Package for the Social Sciences* (SPSS).

Editing was done to the data that has been obtained, which was rechecking Hb test, BMI, and questionnaire, whether the answer has been accurate, relevant, complete, and consistent. Coding was done next, to change the respondent's identity into numbers. After that, data entry was done, to enter the data into the nutrisurvey to obtain the result of energy,

carbohydrate, fat, protein, iron, and vitamin B12 intake which is counted computerize and enter the result of complete blood test and BMI to SPSS for Window, and then the relation was analyzed. Finally the entered data will be cleaned. Relation between nutritional status and degree of anemia was analyzed using Rank Spearman and nutritional status and type of anemia are tested using contingency coefficient. The amount of nutritional intake is described.

## RESULT

In this research, out of 38 respondents, there were 15 men with average of energy intake 71,89%, carbohydrate 74,56%, fat 68,04%, protein 134,38%, iron 98,83%, vitamin B23 25,04%, and 23 women with the average of energy intake 65,42%, carbohydrate 69,21%, fat 63,94%, protein 100,48%, iron 45,3%, and vitamin B12 27,67%.

Out of 38 respondents, there were 14 people with anemia 3 of which are microcytic hypochromic anemia, 11 are normocytic normochromic anemia and the rest 24 people aren't anemia. Based on the degree of anemia, there were 22 people without anemia and 16 people with anemia very mild degree, 15 and 1 people with mild degree.

Out of 38 people found 1 without anemia with poor nutritional status. In the normal nutritional status there were 9 people without anemia, 6 people with very mild anemia, and 1 person with mild anemia. In pre-obese nutritional status, there are 4 people without anemia and 2 people with very mild anemia. In obese nutritional status, there were 6 people without anemia and 7 people with very mild anemia. In obese II nutritional status, there were 2 people without anemia.

Out of 38 respondents, there was 1 person without anemia with poor nutritional status. In normal nutritional status, there were 2 people with microcytic hypochromic anemia, 4 people with normocytic normochromic anemia, and 10 people without anemia with normal nutritional status. In pre-obese nutritional status there were 2 people with normocytic normochromic anemia. In obese I nutritional status, there were 1 person with microcytic hypochromic, 5 people with normocytic normochromic anemia, and 7 people without anemia. In obese II nutritional status 2 people without anemia. Statistical test using spearman correlation test shows nutritional status and the degree of anemia, and type of anemia with the value of  $p = 0,639$  (nutritional status and degree of anemia) and value

of  $p = 0,851$  (nutritional status and type of anemia).

## DISCUSSION

The result of this study, vegetarian in Thien Bao Monastery lack macronutrient, except protein. Based on the interview done with *24 hours food recall* it is known that food substitute are made of gluten and protein where the amount of proteins is adequate. Gluten and proteins mostly processed in vegetarian food as a substitute for meat or fish.<sup>(8)</sup> Nutrition facts in gluten in 100 gr are protein 75,16 gt, 370 kkal, lemak 1,85 gr, and carbohydrate 13,79 gr.<sup>(9,10)</sup> Vegetarians in Thien Bao Monastery (Maha Vihara) have a low iron and vitamin B12 consumption rate. Vitamin B<sub>12</sub> mostly obtained in animal source food compared to plant based food such as kidneys, liver, fish, crab, poultry, and milk.<sup>(11)</sup> Based on the interview *24 hours food recall* it is found that vegetarians in this research infrequently consume milk which contains vitamin B12. Based on the result, it is found that there were more vegetarians in normal nutritional status category and only 6,7% is poor in men and none in women. Based on interview, it is found that the majority of energy, carbohydrate, and fat intake in vegetarians were in poor category, but protein is in higher category and it isn't

suitable with the normal nutritional status. This can be the result from the bias factor from respondent that tend to answer low food intake in those who are fat. This is in accordance with the flat slope syndrome theory, respondents with overweight reported consuming less food than usual.<sup>(12)</sup> In this research, it was found that BMI or nutritional status were mostly in normal category. One of the factors causing BMI in poor category is the amount of protein intake, while the subjects here tend to consume more so they can fulfill energy need from carbohydrate and fat.

Data shows that most common respondent with anemia is very mild anemia with the type normocytic normochromic and respondent with anemia have a low nutritional intake, therefore energy, carbohydrate, fat, protein, iron, and vitamin B12 intake have effect in the occurrence of anemia in vegetarians. Plant-based foods contains high amount of phatic acid and tannin which are inhibitors in iron absorption therefore it caused iron deficiency and vitamin B12 mostly found in animal source foods. Research by Dilla explained that lack of energy caused anemia where protein will be broken down into energy and isn't used to produce red blood cell.<sup>(13)</sup>

In this study, found that most respondents has normal nutritional status and more which is pre-obese, obese I, and obese II. Normal nutritional status and lack of nutritional intake can be a result of bias factor called flat slope syndrome when overweight respondents tend to report less food intake when interviewed and measurement with 24 hours food recall method has limitation in measuring daily nutrition because the measurement is 2x24 hours and depends on the respondent's memory.

There is no significant relationship between nutritional status and degree of anemia, which means nutritional status, has no relations with the degree of anemia. In this research, almost half of the respondents was anaemic, 16 out of 32 people with normal to more nutritional status. Research by Dilla explained that lack of energy caused anemia, and this occur because protein breakdown isn't aim to produce new red blood cell.<sup>(13)</sup> This suit with the interview *24 hours food recall* that energy, carbohydrate and fat intake are in poor category but protein intake is excessive so protein are used to produce energy and isn't used to produce red blood cell.

## CONCLUSION

Based on the research in Vihara Thien Bao (Maha Vihara) in 2017, it was found that the average of energy, carbohydrate, fat and vitamin B12 intake are inadequate in both genders. Average of protein intake is excessive in men and normal in women, and average of iron intake is adequate in men. Lack of iron intake in vegetarian has correlation with the occurrence of anemia and has no relation with normal nutritional status due to flat slope syndrome and the measurement of nutritional intake with 24 hours food recall method has limitations in measuring daily nutrition. This research show that there are no relations between nutritional status and the degree of anemia, and type of anemia with the value of  $p = 0,639$  (nutritional status and degree of anemia) and value of  $p = 0,851$  (nutritional status and type of anemia).

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