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Comparison of Nitrogen Levels in Normal Faeces and Faeces Infected by Ascaris Lumbricoides and Trichuris Trichiura

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ABSTRACT

Nitrogen is part of the main building blocks of protein in the human body. Nitrogen is formed from the breakdown of protein by the body. In the body nitrogen is used as a raw material for the formation of amino acids. In general, the results of the body's metabolism will be excreted through faeces and some in the urine, one of which is nitrogen. With Ascaris lumbricoides infection, nitrogen metabolism will be disrupted, so that excess levels of a substance in the body will be excreted through urine and faeces. Nitrogen levels in the body will be disturbed when the absorption of nutrients is disturbed by the body, for example during a worm infection. Types of helminth infections that commonly occur are soil-transmitted helminths such as Ascaris lumbricoides worm infection. The purpose of this study was to determine the comparison of nitrogen levels in the faeces of patients with Ascariasis infection and in normal faeces. Nitrogen levels were tested by examining the nitrogen levels in the faeces which contained Ascaris worm eggs in the stool specimen. The results showed that nitrogen levels in faeces infected by worms included sample A nitrogen content of 0.19%, sample B obtained nitrogen content of 2.16%, and nitrogen content in sample C was 2.05% with an average of 1.46% while nitrogen in normal stool specimens include sample A nitrogen content of 0.19%, sample B nitrogen content of 0.24% and sample C nitrogen content of 0.25% with an average of 0.22%. This shows that there is an increase in nitrogen levels in the body due to ascariasis infection in the body.

1. Introduction

Nitrogen is a very important element for organisms. Nitrogen is one of the main constituents of protein, which is the main compound in organisms. The function of nitrogen in the human body is as the main ingredient for protein composition, as a nitrogenous base structure for DNA and RNA, hormones, phospholipids and heme and other similar structures [1]. Nitrogen is different from the

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other elements in its group. This is because nitrogen is a gas at room temperature. Nitrogen is a gas that does not have a definite volume and shape [2]. Nitrogen in the body can be obtained from protein. The proteins that exist or are obtained by the body from outside the body will then be broken down into free amino acids. About 1 – 2% of the protein in the body will be broken down every day. At least 75-80% of the freed amino acids will be reused for the formation of new proteins [3].

The process of protein digestion into amino acids occurs in the small intestine with the help of aminopeptidase, tetrapeptidase, dipeptidase, and erepsin enzymes. Excess amino acids in the body and residual nitrogen from the breakdown of protein will be transported to the liver, which is then converted into urea by the liver and excreted from the body through the kidneys in the form of urine (95%) and also through the anus in the form of faeces. 5%) [4].

Besides being found in nature and in the human body, nitrogen can also be found in faeces or faeces, both human and animal faeces, such as cows. Stool is a waste product, the result of the process of digestion of food that is excreted by the body through the anus. Soedjono and Haq say normally a person can produce an average of 30-60 grams of faeces per day [5]. Human faeces are mostly water, digestive residues, organic substances (about 20%) and inorganic substances such as nitrogen, phosphoric acid, and sulphur that have been digested in the small intestine. The estimated nitrogen content in faeces is 5.0-7.0% based on dry weight. While the nutrient content in cow dung is the nitrogen content of 0.3% [6]. Nurmalasari in his research on the analysis of nitrogen levels in guano (bat droppings) found in Andulan cave, Lewu district, stated that the results of the analysis of nitrogen levels in guano (Kalilawar droppings) found in Andulan cave, Lawu Regency were on average 0 .17%. [7].

The presence of soil-transmitted helminth infections such as Ascaris lumbricoides, in the small intestine can cause abnormalities in the intestinal mucosa, such as an inflammatory process in the intestinal wall, widening and shortening of the villi, increasing the length of the crypts, decreasing the ratio of crypt villus and infiltration of round cells to the lamina propria, so that it can lead to infection. This causes problems with the absorption of food by the body. Some of these disorders can return to normal when the worms are removed from the body. The direct measurable effect is an increase in nitrogen levels in the faeces, steatorrhea due to impaired fat absorption, impaired carbohydrate absorption as measured by the xylose test [8].

Based on the above background, the author is interested in conducting research entitled "Examination of nitrogen levels in faeces specimens infected with Soil Transmitted Helminth" in this case the Ascaris lumbricoides worm.

2. Methodology

This study uses a type of laboratory experimental research, which means a research conducted by conducting experimental activities in the laboratory [9]. This experiment was carried out by examining the nitrogen levels in the faeces infected by Soil Transmitted Helminth in this case Ascaris lumbricoides and the nitrogen content in normal (uninfected) stools. The examination was carried out from each of three different samples, namely 3 stool specimens infected by Ascaris lumbricoides and Trichuris trichiura and 3 normal stool specimens.

2.1 Work Procedures

Determination of nitrogen content in stool specimens was carried out using the Kjeldahl method. The Kjeldahl method for determining nitrogen levels is carried out in stages, starting from the destruction stage, the distillation stage and the titration stage (System and Type, no date) [10].

2.2 Destruction Stage

A total of 0.5 grams of the sample was weighed, then put into a Kjeldahl flask and added with 0.5 grams of a mixture of selenium and 3 mL of 98% concentrated sulfuric acid. Furthermore, it is destroyed in a fume hood, first using a low temperature and slowly increasing the temperature until it boils and the colour of the sample solution turns clear.

2.3 Distillation Stage

The cooled sample solution was then diluted with distilled water until the volume became half a boiling flask. Then add 10 mL of 40% NaOH and then distilled. The distilled distillate was accommodated in an Erlenmeyer containing 10 mL of 4% boric acid and had been dripped with MR indicator (Methyl Red) and 3 drops of BCG (Brom Cresol Green) indicator each.

2.4 Titration Stage

The obtained distillate was diluted with distilled water and put into a 100 mL volumetric flask. then 5 mL was taken and put into an Erlenmeyer and titrated with a 0.02 N sulfuric acid solution. The titration was stopped after a color change in the solution from blue to pink.

2.5 Calculation of Nitrogen Content in Stool Specimens

The titration results that have been obtained are then entered into the following formula:

Nitrogen content (%) = ((al-a2) mL ×14 ×0,05 ×5)/c ×100
Information:

i. a1: Standard 0.1 N H2SO4 average used in sample titration (mL)
ii. a2: Standard 0.1 N H2SO4 average used in the titration balance (mL)
iii. 14: Weight equivalent to N
iv. 0.05: Concentration of H2SO4
v. 5: Dilution Factor
vi. C: Sample weight (mg)

3. Results

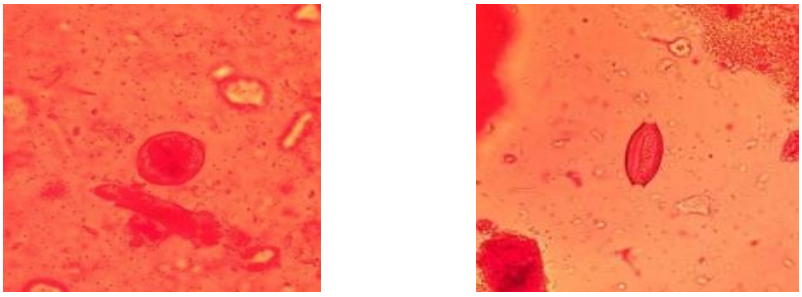
3.1 Research Result

The results obtained can be seen below.

3.1.1 Identify Worm Eggs

Faecal specimens to be examined for nitrogen levels, previously examined for worm eggs to determine whether the stool specimens were positive for worm eggs or not. Stool specimens that are positive for worm eggs will then be examined for nitrogen levels. Based on the faecal examination conducted, worm eggs from the Trichuris trichiura species were found with the characteristics of a crock-like shape, at both ends of the egg there are clear knobs, and the colour of the tengguli is yellow and eggs of the Ascaris lumbricoides species were round in shape consisting of three layers, reddish

brown in color due to the eosin dye. The following is a picture of the identification of worm eggs in faecal specimens viewed with a microscope using a 40x objective lens [11].



(a) (b)

Fig. 1. (a) Eggs of Ascaris lumbricoides (b) eggs of Trichuris trichiura

From Table 1, the nitrogen content in stool specimens with code sample A is 0.19%, code for sample B is 2.16% and in faeces samples coded for sample C is 2.05%.

Table 1
Examination of Nitrogen Levels in Stool Specimens Positive Eggs of Ascaris lumbricoides

No	Sample code	Nitrogen Content
1	A	0,19%
2	B	2,16%
3	C	2,05%

From table 2 above, the nitrogen content in stool specimens with code sample A is 0.19%, code for sample B is 0.24% and in faeces samples coded for sample C is 0.25%.

Table 2
Examination of Nitrogen Levels in Normal Stool Specimen

No	Sample code	Nitrogen Content
1	A	0.19%
2	B	0.24%
3	C	0.25%

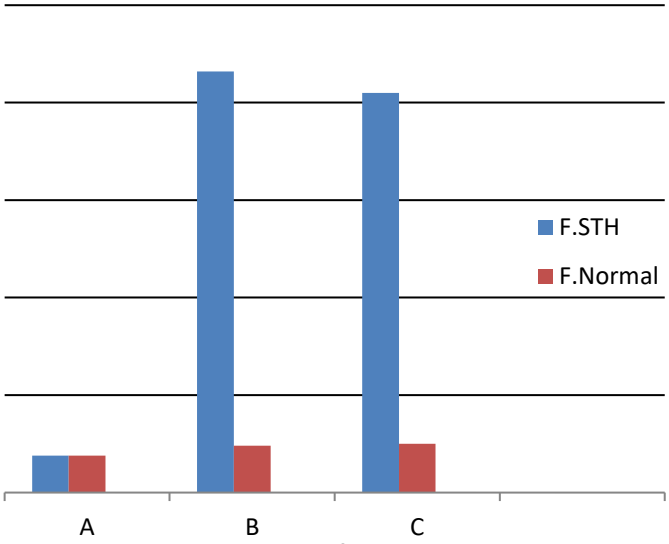


Fig. 2. Comparative Graph of Nitrogen Levels in Normal and Feces Infected Specimens of Ascaris lumbricoides and Trichuris trichiura

3.2 Discussion

From the results of the identification of worm eggs in the stool specimens that have been carried out, it was found that the eggs of Ascaris lumbricoides and Trichuris trichiura were found. According to Soedarto, fertilized eggs of the Ascaris lumbricoides worm are oval in shape, measuring 45-70 microns x 35-50 microns, having an egg layer consisting of three layers, the outermost layer consisting of albumin which is brown in colour because it absorbs bile and has a smooth surface. jagged. The second layer consists of a thin but strong vitelline sheath, then the third layer consists of lipids [12].

Setya explained that the volume of faeces in adults is between 100-300 grams day of which 70% of the volume is faeces, while according to Gotaas the total volume of faeces excreted / day is 83 grams. If you look at the nitrogen content that has been calculated based on its consistency, the average is 0.195% solid faeces, 0.24% semi-solid faeces, 0.25% liquid and fibrous faeces, which is lower than the actual level. This is because the number of stool specimens used is approximately 2 grams. If calculated in total from the volume of faeces excreted is 0.195 × 83 = 16.185. From these calculations, the average nitrogen content in faeces is higher than the normal value, this is due to the different consumption of each person [3].

Campbell and Jane, in their book mentions that the nitrogen in the body is about 3.3% which is found in proteins and amino acids. Examination of nitrogen in stool specimens that are positive for worm eggs uses the Kjeldahl method. Kjeldahl is a simple method for assaying nitrogen in amino acids, proteins and other nitrogen-containing compounds. This method can basically be divided into three stages, namely the process of destruction, distillation and titration [13].

In this nitrogen level test, the sample used for testing is a stool specimen that is positive for Ascaris lumbricoides and Trichuris trichiura eggs. Where from the three samples tested, nitrogen levels were obtained, namely, faeces samples with sample code A 0.19%, samples with sample code B 2.16% and samples with sample code C 2.05%. If it is seen between the samples with codes A and B, C, there is a considerable difference this is due to differences in sample consistency where sample A has a soft sample consistency while samples B and C have a solid sample consistency.

Based on the literature, namely Waluyo, in his book entitled "Waste Bioremediation" states that the nitrogen content of waste in the form of human faeces is 5-7% while in Windi's study, the average N results in adult faeces Normal ones are 0.195% solid stool, 0.24% semi-solid stool, 0.25% liquid and fibrous stool. While in the research that I did, namely the examination of nitrogen levels in stool specimens that were positive for worm eggs, the results obtained an average of 1.47% [14]. This shows that the nitrogen level in stool specimens that are positive for helminth eggs has a higher mean than stool specimens that are not infected with soil-transmitted helminth worms.

According to Charles infection with Soil Transmitted Helminth worms can cause digestive tract disorders or damage to the intestinal mucosa such as inflammation, the intestinal wall, widening and shortening of the villi in the intestinal mucosa, causing impaired absorption of food by the body, the direct impact of which can be measured i.e., with an increase in nitrogen levels in the faeces. Another factor that can cause high levels of nitrogen in faeces is the consumption of nitrogen from each person who is different [8].

4. Conclusions

From the results of research on stool samples infected with Ascaris lumbrocoides worm eggs, Trichuris trichiura and normal stool specimens, it was found that the average nitrogen level in faeces infected by worms was 1.46%, while the average nitrogen content in normal faeces was 0.22%.

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