REFERENCES


ORIGINAL ARTICLE

Giardiasis in Protein Calorie Malnutrition at Gadjah Mada Hospital, Yogyakarta

by

SOEHADI, SOEPRAPTO, MOENGINAH P.A., ISMANGIEN; NOERHAYATI S* and SITI MUSFIROH*

(From the Department of Child Health and Department of Parasitology*, Medical School, Gadjah Mada University, Yogyakarta)

Abstract

The study consisted of forty-one patients hospitalized at the Child Health Department of the Gadjah Mada Hospital in Yogyakarta : 24 children were suffering from PCM with a body weight of more than 60% of the Harvard standard and 17 children from PCM with a body weight of less than 60% of the Harvard standard.

The stools of these patients were examined for Giardia lamblia. The result was 16 (39.02%) positive. The Lipiodol Absorption Test of the patients with Giardia lamblia revealed:

1. 40% from the PCM with a body weight of more than 60% of the Harvard standard were negative.
2. 81.82% from the PCM with a body weight of less than 60% of the Harvard standard were negative.

The lower the nutritional status the higher the risk for Giardia infection.

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Introduction

Protein Calorie Malnutrition (PCM) is one of the 5 major diseases in Indonesian children with a high mortality rate (Djuned S. Pusponegoro, 1968; Poey Seng Hin, 1957). It is known that the etiology of the Protein Calorie Malnutrition is a.o. due to: poor social economic condition, ignorance in the sense of nutrition and chronic infection.

Beside these causes, there is a vicious circle between diarrhea and PCM (Gracey, 1977). Chronic diarrhea or recurrent diarrhea for a long period will result in pathological changes in the mucosa of the gastrointestinal tract (Suharyono et al., 1971) which will further cause a malabsorption syndrome.

Malabsorption syndrome for a long period will finally cause PCM (Suharyono, 1974).

In our cases Giardia lamblia infection gave gastrointestinal symptoms, acute diarrhea, chronic diarrhea, fat and carbohydrate malabsorption (Hoskins et al., 1976; Barbieri et al., 1970; Bajoghi and Maleki, 1974). Sometimes Giardiasis does not show clinical symptoms (Corner, 1959; Ament, 1972; Bancroft, 1974), so that Giardiasis is often not suspected.

The reasons for conducting this study are a.o. to investigate:
1. The correlation of Giardiasis and PCM.
2. The percentage of fat malabsorption in Giardiasis with PCM.

Material and method

Forty-one patients over 1 year of age with PCM and a body weight of less than 80% of 50 percentile of Harvard standard admitted to the Child Health Department of the Gadjah Mada Hospital in Yogyakarta from 1 April 1976 until 30 September 1976 were included in this trial. These patients were divided into 2 groups, i.e.:

Group I: consisting of patients with PCM and body weight more than 60% of the Harvard standard;

Group II: consisting of patients with PCM and body weight less than 60% of the Harvard standard.

The stools of the patients were examined on 3 consecutive days by the concentrated method of Faust (1964) in the Department of Parasitology, Medical School, Gadjah Mada University.

In the stools of the patients whose Giardia lamblia was positive, Lipiodol Absorption Test was done. Lipiodol Absorption Test is a screening method to determine fat malabsorption.

Lipiodol Absorption Test:

Lipiodol consists of poppy-seed oil with the addition of hyrdrolic acid-oil containing 40% iodine. The amount of iodine in the urine reflexes the percentage of lipiodol absorption which in turn is an indication of the ability to absorb dietary fat, mostly "Long Chain Triglyceride" (LCT). The patients should not be on a restricted fat diet for 2 days prior to and on the day of testing.

Discussion

Sensory disturbances and convulsions were the main features which brought our patients to the hospital. All showed mental disturbances ranging from lethargy to coma. Only a few showed excitement. Nineteen patients showed convulsive disorders either prior to admission or during hospitalization.

The pathogenesis of cerebral episodes has been described by Maegraith (1948) who considered anoxia to be of primary importance. This primarily effects the endothelial lining of capillaries and leads to increased permeability of the capillary wall and cell diapedesis. The fluid loss produces intravascular concentration of cells, agglutination and sludging which in turn lead to stasis and anoxia. A vicious cycle thus occurs. Sludging and thrombosis are found especially in the cerebral capillaries (Smitskamp and Woltius, 1971). This is in accordance with the opinion of Devakul et al., (1966), that intravascular coagulation may be important in producing intravascular changes in Plasmodium falciparum infection.

Smitskamp and Woltius (1971) believed that the benefit of heparin in preventing occlusion of cerebral capillaries by anticoagulation outweighs the risk of haemorrhage. This has also been stated by Devakul et al., (1966) and later suggested by Borochovitz et al., (1970) and Jaroonsama (1972). On the other hand, Howard and Collins (1972), based on their result in the absence of a controlled trial in man, stated that heparin therapy must be regarded as experimental in human malaria and potentially harmful. Adverse reactions by heparin in our study have not been encountered.

One of the causes of the death from cerebral malaria is severe anemia and delay in giving blood transfusion (Munir et al., 1976). This was the case in one of our heparin group patients.

The significant difference in mortality (p<0.0001) between the 2 groups in this study revealed that heparin proved to be useful in lowering the mortality of cerebral malaria in children. Beside that the patient’s general condition also rapidly improved.
Introduction

Malaria constitutes one of main diseases in children. Repeated attacks may lead to severe anemia, wasting, stunted growth, enlargement of the spleen and nutritional disturbances. One of the most serious complications, which is almost always caused by Plasmodium falciparum infection, is cerebral malaria. In children the clinical manifestation can be very acute and rarely present a classical picture.

The cerebral episode is thought to be due to cerebral intravascular thrombosis. Heparin, a well-known antithrombotic agent, has been considered effective in the prevention of capillary sludging and thrombosis (Smitskamp and Wolthus, 1971).

The purpose of this study is to find out whether or not heparin is really useful in lowering the mortality of cerebral malaria in children.

Materials and methods

All patients admitted to the Child Health Department, Medical School, Sam Ratulangi University/Gunung Wenang Hospital, Manado from July 1, 1973 until October 31, 1977 with the diagnosis of cerebral malaria, were subjected to this study.

The diagnosis was based on the following criteria:

1. Hyperpyrexia.
2. Cerebral manifestations with or without convulsion, e.g.:
   a. disturbances of mental alertness: apathy to coma, excitement
   b. behavioral changes or psychotic syndrome
   c. convulsive seizures.

3. Negative cerebrospinal findings, e.g.: negative Nonne/Pandy reaction, normal cell count, normal glucose and protein content.

Patients showing abnormal cerebrospinal fluid findings were excluded from the study. Those fulfilling the above mentioned criteria were divided into 2 groups by labeling with a number according to the sequence of admission, an odd number being the control group and an even number the study or heparin treated group. There were totally 33 patients, 17 of them belonged to the control and 16 to the study group. Each group was given the same treatment and management except for the additional heparin in the study group. Details of this procedure has been previously described (Munir et al., 1976).

Results

Thirteen out of 17 patients of the control group succumbed as compared to 2 out of 16 of the heparin group. This gives a mortality rate of 76.5% and 12.5% respectively (Table 1). One of the heparin group patients' death was due to severe anemia before blood transfusion could be given. And the other one was moribund when admitted.

The dose of the orally offered Lipiodol is 5 ml for patients with a body weight up to 10 kg, 0.5 ml/kg body weight for patients between 10 kg and 20 kg and 10 ml for patients above 20 kg.

The negative Lipiodol Absorption Test means: there is fat malabsorption.

The positive Lipiodol Absorption Test means: there is no malabsorption.

Results

Patients without steatorrhoea give a positive reaction (blue colour) due to iodine in up to 1/32 dilution of the urine. Patients with steatorrhoea give no reaction (no blue colour) in all dilutions or give only a positive reaction (blue colour) in undiluted (1:1) or up to 1:4 dilution of the urine.

From the 41 cases in this trial 24 were in the first group and 17 cases in the second group (Table 1). From the first group 5 (20.83%) had Giardia lamblia positive and 19 (79.17%) Giardia lamblia negative in their stools.

The difference in the two groups was statistically significant (p < 0.05).

| TABLE 1: Giardia lamblia examination on the stool's in PCM. |
|------------|-------|--------|--------|-----|
| Group I    | B.W.  | G.L. neg. | G.L. pos. | Total |
| 1          | >60%  | 19      | 5       | 24   |
| 2          | <60%  | 6       | 11      | 17   |
| Total      |       | 25      | 16      | 41   |

It means: the more severe the PCM, the more positive Giardia lamblia in the stools is. Table 1 shows 16 (39.02%) stools with positive Giardia lamblia out of 41 cases.

| TABLE 2: The Giardia lamblia examination on the stools of PCM children with and without diarrhea. |
|-------|-------|-------|-------|-----|
| Group | B.W.  | Without diarrhea | With diarrhea | Total |
|       |       | G.L. — | G.L. + | G.L. — | G.L. + |       |
| I     | >60%  | 4      | —      | 15     | 5      | 24     |
| II    | <60%  | 2      | 2      | 4      | 9      | 17     |
| Total |       | 8      | 33     | 41     |       |
In the first group 4 (16.67%) cases were without diarrhea, and from these cases none (0%) had Giardia lamblia in their stools. From the 20 (83.33%) with diarrhea 15 (62.50%) of the stools were Giardia lamblia negative and 5 (20.85%) were Giardia lamblia positive. In the second group 13 (76.48%) had diarrhea. 4 (23.52%) out of them had no Giardia lamblia and 9 (52.96%) had Giardia lamblia in their stools.

When we observed the cases with positive Giardia lamblia in their stools, there were 2 (12.5%) without diarrheal symptoms and 14 (87.5%) with diarrheal symptoms.

**TABLE 3: The Lipiodol Absorption Test on the PCM with Giardia lamblia.**

<table>
<thead>
<tr>
<th>B.W.</th>
<th>Giardia lamblia (+)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I &gt;60%</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>II &lt;60%</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

In the first group 3 (60%) were lipiodol absorption test positive, it means there was no fat malabsorption; and 2 (40%) were lipiodol absorption test negative, it means there was fat malabsorption.

In the second group 2 (18.18%) cases were found with lipiodol absorption test positive and 9 (81.82%) cases with lipiodol absorption test negative. In all of them the stools were Giardia lamblia positive. When we observed all the 16 cases with positive Giardia lamblia in their stools, there were 11 (68.75%) with lipiodol absorption test negative.

**Discussion**

In the human body Giardia lamblia lives in the distal part of the duodenum and the proximal part of the jejunum (Hoskins et al., 1967; Barbieri et al., 1970; Kamath Murugasu, 1974; Ament, 1972; Borbezat et al., 1967; Belding, 1961). Giardia lamblia lives in the intervillous spaces and sticks on the surface of the villi with the sucking disk.

The pathogenesis of the Giardia lamblia is not understood clearly. Ament (1972) found that Giardia lamblia causes lesions in the mucosa of the jejunum

**ORIGINAL ARTICLE**

**Heparin in the Treatment of Cerebral Malaria**

by

M. MUNIR, H. TJANDRA, T.H. RAMPENGAN, I. MUSTADJAB and F.H. WULUR

(Department of Child Health, Medical School, Sam Ratulangi University/Gunung Wenang Hospital, Manado)

**Abstract**

Cerebral episodes in malaria are considered to be due to thrombin in the cerebral capillaries. Heparin is beneficial in arterial thrombosis, not only on account of its anticoagulating property, but also by virtue of its slight vasodilating effect which promotes collateral circulation. Based on these, a study was undertaken with the object of finding out the effect of heparin in the treatment of cerebral malaria.

Thirty-three cases admitted to the Child Health Department, Medical School, Sam Ratulangi University/Gunung Wenang Hospital, Manado from July 1, 1973 until October 31, 1977 were divided into 2 groups: a study group receiving 300 u/kg bw/day of heparin either intramuscularly or intravenously for 3 consecutive days along with antimalarial drugs; and a control group receiving only antimalarial drugs.

Thirteen out of 17 patients of the control group succumbed (76.5%) as compared to 2 out of 16 patients of the heparin group (12.5%). This study shows that heparin seems to be of real benefit in the treatment of cerebral malaria in children, since not only the mortality rate reduced significantly but the general condition improved rapidly.

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Bajoghli and Maleki (1974) found Giardia lamblia positive in the stools in 10% of 2,983 malnourished diarrheal cases. Barbezat et al. (1967) found 75% Giardia lamblia positive in the jejunal juice. These methods except stool examination are very difficult, and it can only be done in hospitals with complete facilities. Based on these facts it seemed that if in this study other methods of Giardia lamblia examination had been done, there would have been more positive cases.

Another suggestion is that if there is Giardia lamblia in the stools, metronidazole with a dose of 40 mg/kg BW/day should be given as the drug of choice, or a similar drug with a daily dose of 8 mg/kg BW/day for 10 days.

At least to decrease the incidence of Giardiasis better sanitation and hygiene are suggested.

Summary

1. Giardia lamblia was positive in 39.02% of the stools of PCM cases.
2. a. Lipiodol Absorption Test negative (fat malabsorption) was found in 40% of malnourished (PCM) cases with a body weight of more than 60% of the Harvard standard with Giardiasis.
   b. Lipiodol Absorption Test negative (fat malabsorption) was found in 81.82% of malnourished cases with a body weight of less than 60% of the Harvard standard with Giardiasis.

Conclusion

The lower the nutritional status the higher the risk for Giardia lamblia infection.

Thus the frequency of diarrhea decreased sharply from 24 hrs, and stopped at 72 hrs after institution of salt-coconut water solution orally. On the contrary, the mean frequency of diarrhea in the oratryolite group increased in the first 24 hrs and decreased after 48 and 72 hrs of oral rehydration (Fig. 3).

Sunto et al., (1977) also reported from their study the increase of frequency of diarrhea in the first 24 hrs after oral rehydration using a pedialyte solution.

In 12 out of 21 cases (57%) of the coconut water group diarrhea stopped in the first 24 hrs after oral rehydration, and the rest stopped within 48 hrs; whereas in the oratryolite group where oral rehydration was started within the first 24 hrs, 48 hrs and 72 hrs or more, diarrhea stopped in 13.3% (2 out of 15), 20% (3 out of 15) and 66.7% respectively (Fig 1).

Coconut water contains not only electrolytes such as Na⁺, K⁺, Ca²⁺, and Mg²⁺, but also amino-acids which increase sodium and water reabsorption that will reduce the frequency of diarrhea and the amount of sodium and water losses (Desjeux et al., 1977).

During this study we did not find any side-effects by using salt in half strength coconut water as an oral electrolyte solution, except in one case in the oratryolite group which showed ankle oedema.

Acknowledgement

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perkakulamia with paresthesia of the extremities, listlessness, mental confusion, paralysis, hypotension, heart block, and cardiac arrythmia (Martindale, 1978).

Harran Nurisid et al., (1977) reported in their study that the results of undiluted coconut water given orally to children with cholera were good without any side-effects such as hyperkalemia. Diluting coconut water to its half strength will reduce potassium concentration from 45-56 to 22-28 meq/l and this prevents the occurrence of side-effects.

The technique of taking finely ground salt with two fingers, thumb and index finger, is originated from cooking practices in the community; so this technique is universally accepted without being influenced by educational levels or any socio-economic conditions in the community. It is clearly shown that the mean weight of one pinch is 220 mg, so that two glasses of half strength of coconut water need only 6 pinches of finely ground salt to get a sodium concentration of 57 meq/l. Hence, the concentration of sodium and potassium of this solution is quite similar with the stool's composition of infantile diarrhea (Mahalanabis, 1970).

From this study it can obviously be seen that the frequency and the duration of diarrhea in the coconut water group were less than those in the oratroyte group. The mean frequency of diarrhea of the coconut water group before and after 24, 48 and 72 hrs of oral rehydration was 9.1, 5.5, 1.6 and 0 respectively.

![Graph](image)

**FIG. 3**: The frequency of diarrhea before and after rehydration