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Role of Screening Tests and Anemia in a Resource Poor Setting

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Abstract

Objective: To estimate the prevalence of anemia in the community as a hospital-based study and to assess the influence of co-factors by using basic screening tests in Pilar Health Center in Andaman Nicobar Islands.

Material and methods: In three months, among the patients who were admitted, all patients with clinical suspicion of anemia and confirmed with hemoglobin estimation were included and investigated for malaria and leptospira as cause of anemia. The initial rapid diagnosis of malaria was confirmed with species identification by smear. Clinically suspected cases of leptospirosis were confirmed with IgM antibodies for leptospira.

Intervention: For patients with anemia, dietary advice and parenteral therapy of Vitcofol injection and iron Dextran therapy were given. Chloroquine therapy was started followed by a dose of Primaquine for patients with malaria. The patients with leptospirosis were started on Crystalline Penicillin which was given six hourly for five days.

Results: A total of 980 patients were admitted;120 patients (17%) were diagnosed with malaria. Severity of anemia as shown by Grade 3 was seen more in malaria cases than in control group. Odds ratio = 1.69 indicated a positive association between anemia and malaria. Severe anemia was seen in third decade, both in malaria and leptospira cases probably due to the mobility of adult patients and accessibility to Port Blair. 48.9% of the population examined was anemic, indicating extent of anemia in the population. Age and accessibility play a major role in anemia in malaria and leptospirosis and in their clinical outcome.

Key words: *Anemia; Malaria; Leptospirosis; Andaman Islands.*

Introduction

The Andaman and Nicobar Islands is an Indian union territory which has 390 islands, of which 108 are permanently inhabited. It is home to various tribes such as the Great Andamanese, Nicobarese, Shompens, Onges, Sentinalese as well as migrants from Bengal, Tamil Nadu, and various parts of north and south India. Anemia is a condition which is rampant in the Andaman and Nicobar group of islands. It is also one of the primary risk factors for infections, stroke and ischemic heart disease. The Centre for Disease Control, in their survey in 2004, had enlisted Andaman and Nicobar group of islands for the prevalence of anemia (1). A large population of the Andaman live in islands far off from the main capital, Port Blair and so is deprived off all the nutritional facilities. Seventy percent of India's population, and a majority of its poor, live in rural areas and more. This trend is seen more in these islands where people do not come to hospital as they cannot afford the transport for traveling from one island to Port Blair. As many of them

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are not well connected to the outside world, the awareness among the people regarding anemia is poor.

Although the greatest morbidity and mortality attributable to malaria occurs among children in Africa, up to one third of the world's malaria burden is borne by non-African countries, where levels of endemicity are lower. Andaman and Nicobar Islands, being an endemic union territory, has been associated with malaria from historical times. The increasing findings of low haemoglobin in such patients and its related morbidity are of great concern. Sadly, majority of developing countries have a paucity of estimates of the prevalence of anemia and its possible causes, especially in the rural areas. With this background, an attempt has been made to estimate the prevalence of anemia in the community as a hospital-based study and to assess the influence of co factors by using basic screening tests in Pilar Health Center in Andaman Nicobar Islands.

Materials and methods

During a period of three months, among the patients who were admitted, all the patients with clinical suspicion of anemia were included for the study. The demographic details including location and laboratory investigations including hemoglobin and urine examination were available for all patients. Hemoglobin level of 10gm/dl was taken as cut off level to decide the patient as anemic or not. These patients were further investigated for cause of anemia. The patients with evident causes of chronic blood loss which could lead to anemia such as menorrhagia, haemorrhoids were excluded from the study. The initial rapid diagnosis of malaria was confirmed with species identification by smear. Clinically suspected cases of leptospirosis were confirmed with IgM antibodies for leptospira. The patients with leptospira had a varied type of presentation ranging from fever, vomiting, cough, generalized weakness or reddish discoloration of eyes for a short period of time.

The mean hemoglobin level of patients with malaria and patients who were negative for malaria but had anemia were compared. A similar comparison was also made for leptospirosis. The severity of anemia based on grade was correlated with malaria and leptospirosis. In malaria, further correlation was done with species.

The data which was collected was then entered in an excel spread sheet. The data was analyzed using excel spread sheet for simple analysis, and for chi – square test and frequency, SPSS10 software used.

Intervention

For patients with anemia, dietary advice and parenteral therapy of vitcofol injection and Iron Dextran therapy were given. The patients who required blood transfusions to were advised to go GB Pant Hospital in Port Blair. Once the diagnosis of malaria was confirmed, Chloroquine therapy was started followed by a dose of Primaquine. Chloroquine-resistant malaria patients were started on Quinine. The patients with leptospirosis were started on Crystalline Penicillin which was given six hourly for five days. All the patients were monitored for signs of complications and were discharged after the treatment. As the patients were coming from different islands for treatment, only limited follow up could be done.

Results

During the study period, a total of 980 patients were admitted. Among them 120 patients (17%) were diagnosed with malaria (male- 65, female 55). In the age-wise distribution, third generation showed more number of cases probably because they were able to come to Port Blair for treatment. Plasmodium vivax (59%) was more predominant than Plasmodium falciparum (33%). Eight percent of cases showed mixed malarial infection.

When the levels of hemoglobin were compared between the two groups, patients with malaria showed lower hemoglobin

(8.3gm/dl) compared to the control groups (8.7 gm/dl)which was significant (unpaired t test p<.05) . Comparison of the species showed P.falciparum along with low levels of hemoglobin (7.9gm/dl). Anemia was graded as 0, 1, 2 and 3 based on the hemoglobin levels (Above 11gms as 0, 11-9gms as 1, 7-9gms as 2 and less than 7gms as 3). The severity of anemia (shown by Grade 3) was seen more in malaria cases than the control group Table 1 (Odds ratio- = 1.69 X2 = 0.77, P > 0.05) indicates a positive association of anemia and malaria. With advancing age, the level of hemoglobin also decreased. More cases of anemia were associated with Plasmodium falciparum infection than P.vivax (Odds ratio= 1.57,X2 = 0.99, P >0.05).

The mean level of hemoglobin in patients with leptospirosis (n=120) was 8.7gm/dl which was close to the control group and the difference was not significant. The number of cases and the severe anemia cases were seen in the third generation, probably again indicating the mobility of patients and the accessibility to Port Blair.

Discussion

Plasmodium falciparum malaria causes 1-2 million deaths per year. Most deaths occur as a result of complications such as severe anemia and cerebral malaria. Anemia in malaria is multifactorial (2). The causes include obligatory destruction of red cells at merogony, accelerated destruction of non-parasitized red cells, bone marrow dysfunction that can persist for weeks, shortened red cell survival and increased splenic clearance. Massive gastrointestinal hemorrhage can also contribute to the anemia in malaria. The fact that 120 patients (17%) who were affected with malaria had anemia, reinforces the positive association of malaria with anemia (odds ratio 1.69), though the severity varied.

Red cells of children with severe malaria-associated anemia (SMA) have acquired deficiencies in the complement regulatory proteins complement receptor 1 (CR1, CD35) and decay accelerating factor (DAF, CD55)(3). The results of a study from Western Kenya suggest that the decline in red cell CR1 and CD55 seen in children with SMA is of physiologic significance and may predispose erythrocytes to complement-mediated damage and phagocytosis in vivo(4). The present study has shown that anemia was associated with malaria (p<.05) and more with *Plasmodium falciparum*. However, it has also been shown that clinical features in Indian children differed from those reported in most studies that involved an African population. Multiple organ dysfunction emerged as an important presenting feature and a new predictor of death in childhood malaria in a study conducted in Orissa (5). As the present study was a hospital- based study, which may not truly reflect the population, it is difficult to validate this finding.

48.9% of the population examined was anemic indicating the extent of anemia in the population. Compared to patients with malaria, in patients with leptospirosis the hemoglobin level was higher and similar to control group. The number of cases and the severe anemia cases were seen in the third generation, similar to patients with malaria, probably again indicating the mobility and accessibility to Port Blair. Age and accessibility to treatment play a major role in anemia in malaria and leptospirosis and in their clinical outcome.

Table 1: Association between malaria and severity of anemia

	Anemia grade3 No.of patients	Anemia grade 1 &2 No. of patients	Total
Malaria	24	83	107
Non malaria	15	88	103
	39	171	210

Declaration: Conflict of interests - NIL

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