E-ISSN:2349-3267
P-ISSN:2349-5499
Research Article
Blood Loss

Pediatric Review - International Journal of Pediatric Research
2020 Volume 7 Number 8 November-December

Publisher
MEDRESEARCH
www.medresearch.in

Screening for fecal occult blood loss in severely malnourished children

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DOI: https://doi.org/10.17511/ijpr.2020.i08.05

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Introduction: PEM is the most important and basic hurdle in the triple-M complex of malnutrition, morbidity, and mortality. Very high mortality has been reported in severe PEM. PEM is found to account for about 4 million deaths in children. The study aimed to perform a fecal occult blood test in patients in the age group of six months to five years and also to identify the conditions associated with fecal occult blood loss in pem patients**. Materials and Methods:** A total of 100 indoor patients of PEM admitted in our pediatric ward were taken as subjects in this study. According to WHO and IAP classification of PEM, severe malnutrition (marasmus, kwashiorkor, and marasmic kwashiorkor) were taken as study group; and mild grades of PEM (grade I and grade II) were taken as a control group. **Results:** In severe PEM, marasmus (83%) was more common followed by kwashiorkor (14%) and marasmic kwashiorkor (3%); however in mild grades of PEM, grade I PEM was found in 58% and grade II PEM was found in 42%. In severe PEM, pallor (64%), hair changes (38%), and tachypnoea(31%) were major clinical signs; while tachypnoea(36%), dehydration (26%), and pallor (20%} were major clinical signs in patients with mild grades of PEM. **Conclusion:** A positive fecal occult blood test (FOBT) is strongly associated with moderate to severe anemia in severe PEM patients. So all patients having a positive FOBT should have a hemogram profile done and then appropriately treated for anemia.

Keywords: Children, Fecal blood loss, Malnourishment, SAM

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How to Cite this Article

Malde T, Pabani G, Mirza SM, Shukla OP. Screening for fecal occult blood loss in severely malnourished children. Pediatric Rev Int J Pediatr Res. 2020;7(8):420-424.
Available From https://pediatrics.medresearch.in/index.php/ijpr/article/view/640

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Manuscript Received	Review Round 1	Review Round 2	Review Round 3	Accepted
2020-12-09	2020-12-19	2020-12-25		2020-12-28

Conflict of Interest	Funding	Ethical Approval	Plagiarism X-checker	Note
No	Nil	Yes	7%	

Introduction

PEM is a global health problem, more prevalent in developing countries. PEM is a disease of poverty, affecting nearly 150 million children under the age of 5 years in the world. The majority of the children in India are to live below the poverty line in an environment of multi deprivation and starvation [1].

It has been estimated that in India 65% i.e. nearly 80 million children under 5 years of age suffer from varying degrees of malnutrition. Out of 120 million children in India, over 75 million are estimated to suffer from visible PEM. Severe malnutrition represents the only tip of the iceberg [2,3].

PEM is the most important and basic hurdle in the triple-M complex of malnutrition, morbidity, and mortality. Very high mortality has been reported in severe PEM. PEM is found to account for about 4 million deaths in children. It is still the first killer disease [54%] followed by acute respiratory infection [20%] and diarrhea [18%] in the global perspective [4].

Severe anemia in PEM is usually caused by iron and or folic deficiency. It may also be due to dysentery, malaria, or any other chronic infection or disease [5]. Gastrointestinal tract [GIT] blood loss leading to anemia in children with severe malnutrition may occur as a result of H.Pylori infection, helminthic infection [hookworm, Trichuris trichura], or consumption of whole cow milk or formula feed. Ignorance of these factors may be responsible for occult blood loss so this may delay the improvement of the clinical condition [6].

Therefore, it is necessary to identify the subset of severely malnourished children with occult gastrointestinal blood loss. This may even serve as an indicator to identify children at higher risk of mortality in this vulnerable group. Early interventions and time management could be done in such patients to reduce mortality [7].

So this preliminary study was carried to detect the presence of occult blood in severely malnourished children [8]. It is hoped that it will open a new spectrum for diagnosing and managing occult gastrointestinal blood loss in stools. Hence the study aimed to perform a fecal occult blood test in patients in the age group of six months to five years and also to identify the conditions associated with fecal occult blood loss in pem patients.

Materials and Methods

A case-control study was conducted in the department of pediatrics, medical college; between July 2008 to December 2008 for 6 months. A total of 100 indoor patients of PEM admitted in our pediatric ward were taken as subjects in this study.

According to WHO and IAP classification of PEM, severe malnutrition (marasmus, kwashiorkor, and marasmic kwashiorkor) were taken as study group; and mild grades of PEM(grade I and grade II) were taken as the control group.

After enrolment in the study, a detailed history (symptoms, diet, immunization, and anthropometry) and a thorough examination were done. All patients were given a 5 ml plain bulb for stool collection and stool was sent to the laboratory within a half-hour of collection.

Study population:

Sample size: 100 patients (50 cases and 50 controls)

Study design: Case-control study, random selection

Inclusion criteria:

► Indoor patients of PEM admitted to the pediatric ward.

► **Age group:** 6 months to 5 years.

► **Classification for PEM:** WHO and IAP.

► **Control group:** grade I and grade II.

► **Study group:** marasmus, kwashiorkor and marasmic kwashiorkor.

Exclusion criteria:

► **Diet:** patients who have eaten non-veg. food 18 hours before stool collection.

► **Drugs:** patients on iron and ascorbic acid.

Test for occult blood:

Hematest kit: It is a non-benzidine test kit for detecting occult blood loss in stools. It is manufactured by BIOLAB DIAGNOSTICS PVT. LTD. The peroxidase-like activity of hemoglobin catalyzes the reaction of hydrogen peroxide and o-Dianisidine to form a BLUE color medium indicating the presence of free Haemoglobin.

► **Reagents supplied:**

- Dianisidine 1%
- Buffer 99%
- Hydrogen peroxide 6%
- Negative Control 10ml
- Positive Control 10ml
- Contains bovine hemoglobin-0.1 % preservatives and stabilizers.

Stability: Stable at 25-35 degrees celsius for 2 years. Hydrogen peroxide may deteriorate on exposure to light. In such conditions use commercially available 6% hydrogen peroxide.

Sample: To prevent false-positive reactions, boil the stool sample at 100 degrees celsius for one minute and instruct patients not to take non-vegetarian foods for at least 18 hours before stool collection.

Limitations: This test is highly sensitive to the peroxidase activity of free hemoglobin. False-negative may be observed if unruptured RBC is present. A low concentration of hydrogen peroxide makes false-negative results. Strong hydrogen peroxide (30%) bleach the final color leading to a false negative. The false-positive result may be observed in stool samples containing vegetable peroxidase and myoglobin (meat; non-veg.) from food intake.

Procedure: Sprinkle a pinch of Haemtest powder and a drop of Activator (6% hydrogen peroxide) to the sample on a piece of filter paper. Occult blood if present will be indicated by blue color. Also, use a negative and positive control to establish the accuracy of the methodology.

Blue color - positive

No blue color - negative.

Results

The present study was carried out in the department of pediatrics, Medical college over six months. A total of 100 patients was enrolled in the study (50 cases and 50 controls). marasmic kwashiorkor (all severe grades of PEM) were taken as study group; mild grades of PEM (grade I and grade ll PEM) were taken as Marasmus, kwashiorkor and control group, irrespective of their morbidities patients had at the time of admission.

Age distribution of study group shows that 76% were from 2 year age indicating severe PEM is more common in this age group. Age distribution of the control group shows that 54% are of 1 to 3 years indicating mild grades of PEM are common in this age group. Age distribution of the control group shows that 54% are of 1to 3 years indicate mild grades of PEM is common in this age group.

Study shows that fever (86%), vomiting (34%) and diarrhea (35%) were major symptoms in severe PEM patients. Vomiting (48%) was more common than diarrhea (36%) and fever (46%) in the control group. The result showed that in the case group the majority of patients had pallor (64%) and hair changes (38%) and tachypnoea (31%) whereas most patients in mild grades of PEM were having tachypnoea (36%), dehydration (26%) and pallor(20%). The study showed that marasmus is more common (83%) in the study group. PEM grade I is more common (58%) than PEM grade II in the control group. Anemia was common in the study group, whereas in the control group it was not common.

The result shows that that albendazole (62%) was given to most of the cases for deworming as per WHO treatment protocol of malnutrition. (AII cases had received antibiotics and no one was given iron in the first week of admission due to associated illness with PEM). Most of the study group (64%) had fecal occult blood positive (significant at p value< 0.05). Controls (88%) had mostly fecal occult blood is negative and only 12% of controls had fecal occult blood test positive.

Table-1: Symptoms recorded in the present study.

Symptoms	Control Group	Case group
Diarrhoea	18	20
Cough	14	16
Vomiting	24	20
Fever	23	50
Weight loss	10	19
Anorexia	11	21

Table-2: Sign diagnosed in the present study.

Signs	Control group	Case group
Oedema	0	10
Severe dehydration	2	5
Tachypnoea	18	18
Pallor	14	37
Hair changes	2	22
Skin changes	4	6

Table-3: Treatment profile in the study.

Treatment profile	Control group	Case group
Albendazole	36	6
BT	16	4
Iron	0	0
AKT	6	3
Zinc	20	14

Discussion

This study was conducted in the Department of Paediatrics, Medical college from July 2007 to December 2007 over six months. The study group included 58 severely malnourished patients (marasmus, kwashiorkor, and marasmic kwashiorkor); and the control group included patients having mild grades of malnutrition.

(PEM grade I and II). Severe PEM was more common (76%) in less than 2 years of age while mild PEM was more common (54%) in the 1 to 3 years age group.

In severe PEM fever (86%), vomiting (34%), and diarrhea (36%) were the main symptoms; while, in mild grades of PEM, vomiting(48%), fever(46%), and diarrhea (36%) were main symptoms. A study by Sarika Jain and Shukla Das [8] in Delhi shows that in severe PEM, the main symptom was diarrhea (50%) and not fever.

A study done by V Bhatia [9] in the slums of Chandigarh, in 2007 shows that diarrhea, cough, and fever was common in mild grades of PEM.

In severe PEM, marasmus (83%) was more common followed by kwashiorkor (14%) and marasmic kwashiorkor (3%); however in mild grades of PEM, grade I PEM was found in 58% and grade II PEM was found in 42%. A study was done by A.H. Salami et al [10], in Maiduguri Nigeria, also shows that marasmus is more common (62%) in severe PEM.

In severe PEM, pallor (64%), hair changes (38%), and tachypnoea (31%) were major clinical signs; while tachypnoea (36%), dehydration (26%), and pallor (20%} were major clinical signs in patients with mild grades of PEM. In a study done by Sarika Jain and Shukla Das in Delhi, fecal occult blood was positive in 60% of severe PEM.

In the same study done by Sarika Jain and Shukla Das in Delhi, none of the controls were positive.

Conclusions

A positive fecal occult blood test(FOBT) is strongly associated with moderate to severe anemia in severe PEM patients. So all patients having a positive FOBT should have a hemogram profile done and then appropriately treated for anemia.

What does the study add to the existing knowledge?

It is recommended that fecal occult blood tests should be performed as a routine screening procedure among all severely malnourished children for detection and timely-treatment of occult blood loss.

Author's contribution

Dr. Triya Malde: Concept, study design

Dr. Gaurang Pabani: Manuscript preparation

Dr. Mohmmad Shahid M. Mirza: Manuscript preparation

Dr. Om Prakash Shukla: Statistical analysis

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