



Prevalence of Intestinal Parasitic Infection Among the 1-15 Years Age Group Children and Its Association with Iron Deficiency Anemia

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 17 Oct 2023	<p>Background and Objective Intestinal parasitic infection and iron deficiency anaemia are still, a significant public health concern mostly in developing countries. The present study aimed to study the relationships between intestinal parasitic infections and iron deficiency anaemia among the 1-15 years age group of children. There are many helminths, transmitted through the soil like <i>Ascaris lumbricoides</i> (roundworm), <i>Trichiuris trichiura</i> (whipworm), <i>Ancylostoma duodenale</i>, and <i>Necator americanicus</i> (hookworms). These infections are most prevalent among the children Methods: In this study the stool samples were collected from above age group children for parasitic infection and Hb, PBF examination was also conducted to rule out the anemia at verto medical lab. There may be chances of IDA because of the nutrition deficiency but if the occult blood positive and parasites in stool, suggestive of anemia due to the blood loss. Results: The sample was collected and processed out of that 19% samples were positive for intestinal parasites. Particularly the <i>Entamoeba coli</i> was 6%, <i>E. histolytica</i> was 2%, <i>Ascaris</i> and <i>Giardia</i> was 7%. <i>Giardia</i> percentage was high and fecal occult blood was positive of all sample containing parasites except <i>Entamoeba coli</i>, the FOB was negative. The patient with intestinal infection usually having low hemoglobin value and peripheral examination populated with predominately microcytic hypochromic picture. Conclusion: The reveals the relationship between the role of intestinal parasites in loss of iron that gives the impact on hemoglobin synthesis revealed in blood film examination. finding proof of IDA. The study also helpful in early diagnosis of IDA through few parameters mentioned in study.</p> <p>Keywords: Intestinal parasites, Occult blood, Peripheral blood film, Iron deficiency, anemia.</p>
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1. Introduction

Helminths are worms with many cells. Nematodes (roundworms), cestodes (tapeworms), and trematodes (flatworms) are among the most common helminths that inhabit the human gut. Usually, helminths cannot multiply in the human body. (1)Protozoan parasites that have only one cell can multiply inside the human body(2). There are four species of intestinal helminthic parasites, also known as geohelminths and soil-transmitted helminths: *Ascaris lumbricoides* (roundworm), *Trichiuris trichiura* (whipworm), *Ancylostoma duodenale*, and *Necator americanicus* (hookworms). These infections are most prevalent in tropical and subtropical regions of the developing world where adequate water and sanitation facilities are lacking.(3) Recent estimates suggest that *A. lumbricoides* can infect over a billion, *T. trichiura* 795 million, and hookworms 740 million people. The burden of disease is related to less mortality than to the chronic and insidious effects on health and nutritional status of the host. (4)In addition to their health effects, intestinal helminth infections also impair physical and mental growth of children, thwart educational achievement, and hinder economic development.(1)

The most common intestinal protozoan parasites are: *Giardia intestinalis*, *Entamoeba histolytica*, *Cyclospora cayentanensis*, and *Cryptosporidium* spp. The diseases caused by these intestinal protozoan parasites are known as giardiasis, (5) *G. intestinalis* is the most prevalent parasitic cause of diarrhoea in the developed world, and this infection is also very common in developing countries. Amoebiasis is the third leading cause of death from parasitic diseases worldwide, with its greatest impact on the people of developing countries.(6) The World Health Organization (WHO) estimates that approximately 50 million people worldwide suffer from invasive amoebic infection each year, resulting in 40-100 thousand deaths annually.(7) The conventional technique used to detect the intestinal parasites is better and low-cost diagnostic technique.(8) In this study researcher used a hematological parameters and routine stool examination method to diagnose the IDA and relationship between the parasitic infection and its impact on erythroblast in bone marrow where iron incorporated in proerythroblast and does the haem synthesis, in parasitic infection blood continue to ooze out from the site of infection.(9) The amount of occult can't be detected through color or other physical examination however, if stool color is black that is the one indication for the blood presence in stool. (6)The confirmation can be done chemical examination, the occult positive doesn't confirm the parasitic infection because occult blood can be positive in case gastrointestinal bleeding due several other reason like ulceration in GI tract.(10)

Stool microscopic examination is one of the gold standard methods but required patience while looking for cysts or ova of parasites under microscope. The biggest challenge in early detection of parasitic infection is sample collection, people don't want to give stool sample, at early stage of infection patient having the mild pain in stomach, it increases with passes of time and may develop iron deficiency.(2) Post parasitic infection there is progress in anemia with symptoms like irritability, mood disorders, nail become spoon like, excessive hunger, eating of unusual substance like soil, chalk, starch (uncooked rice) ice cubes etc. physical symptoms are like skin color changes reddish to whitish, lethargy. So, in children if this type of symptoms is developing immediately shown to the physician and ask for stool and hemogram examination, it is not expensive, can afford by low-income people and good enough to diagnose parasitic infection among the children.(11, 12).

2. Materials And Methods

Study design and sample collection

In this study the stool samples were collected from the rural area of Phillaur and Gorya of different age group children. (4)The samples were and processed at verto medical lab. The samples were recommended by the physician if they found any clinical symptoms of anemia in patient or coming with stomach pain, loose motion etc.(3) Total 100 samples were collected for stool analysis and HB, HCT Film was prepared to analysed the IDA. The biggest challenge in the study was the collection of stool sample most of the patient not ready to give.

Analysis of stool sample – The stool was examined physical, chemical and microscopic examination.(13) The consistency of stool was hard to loosen, and the colour of stool was brownish to dark color. The dark and hard consistency of stool indication of parasitic infection and blood presence.

Occult blood analysis - The occult blood performed by taking clean glass slide and added 2 drops of NN benzidine + 2 drops of hydrogen peroxide + small amount of stool, mix all and note down the color of stool, If the color appears greenish to blue shows the positive result for occult blood. The test was also confirmed by card method also.(14, 15)

Microscopic examination of stool

The freshly voided stool sample were collected and taken the clean grease free slide, added the 1 drop of the iodine solution and 1 drop of normal saline on same slide after that added the stool sample with an applicator in both saline and iodine solution. After that cover with coverslip and examined under microscope for cysts or ova in slide. (16)

Hemoglobin estimation – The hemoglobin and HCT estimation done by portable haemoglobinometer QUICK- CHECK plus (ACON biotech). In these techniques the blood collected form the fingertip and filled in capillary blood transfer tube added on strip, within few second result display.(14, 17) The

validation of report accomplished by cyanmethaemoglobin method and control strip provided along with instrument. The report hematocrit displayed with hemoglobin parameter.

Peripheral Blood Film Examination – During the collection of blood for HCT and Hb, the blood smear prepared and dried after that stained with Leishman’s stain. Primarily the smear was dried and added leishman stain and waited for 2 minutes after that buffer was added mixed well and waited for 10 minutes. (18) Later the blood smear examined under microscope and added a 1 drop of cedarwood oil (oil immersion) and looked for the examination of abnormal red cells morphology. If PBS showing microcytosis, anisocytosis, anisopoikilocytosis with elliptical cells and hypochromia that usually associated Iron deficiency anemia and grading of anemia depends up the microcytes HB, HCT and hypochromic cells in PBS.(19).

3. Results and Discussion

The samples were collected and processed out of that 19% samples were positive for intestinal parasites. Particularly the *Entamoeba coli* was 6%, *E. histolytica* was 2%, *Ascaris* and *Giardia* was 7%. *Giardia* percentage was high and fecal occult blood was positive of all sample containing parasites except *Entamoeba coli*, the FOB was negative. The patient with intestinal infection usually having low hemoglobin value and peripheral examination populated with predominately microcytic hypochromic picture.

Table 1 according to age of sample collection

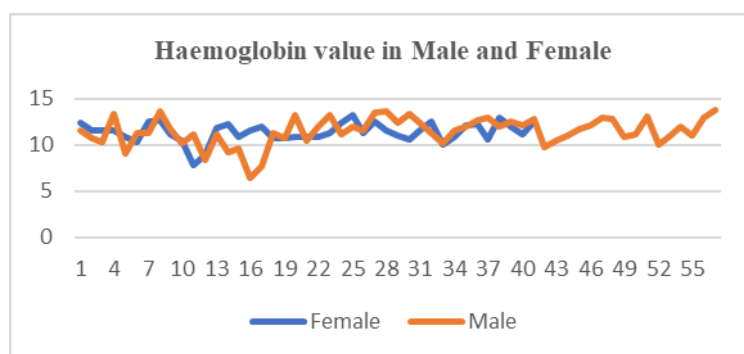
S.No.	Age	Number of patients
1	1-5 years	28
2	6-10	38
3	10-15 years	35

Table 2 – Gender distribution

S.No.	Sex	Number of patients
1	Male	42
2	Female	56

Table 3– Parasitic infection distribution and presence of occult blood

	<i>Entamoeba coli</i>	<i>E. histolytica</i>	<i>Ascaris lumbricoides</i>	<i>Giardia</i>
Parasites No	6	2	4	7
Occult blood	Negative	Positive	Positive	Positive



Graph: 1 Hemoglobin distribution in male and female

The graph 1 showing the comparison of hemoglobin status in male and the female. Usually, the hematological values differ in case of the patient having anemia with parasitic infestation.

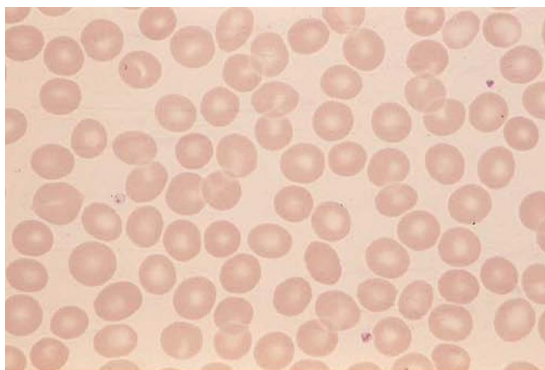


Image :1 Normocytic normochromic

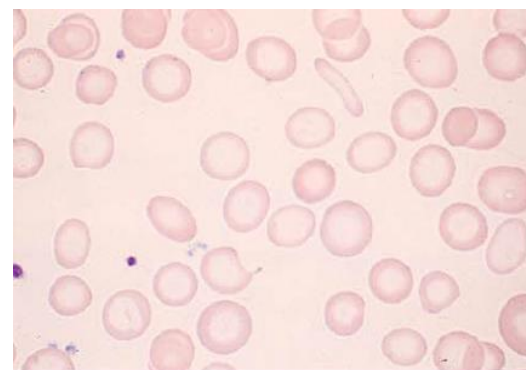


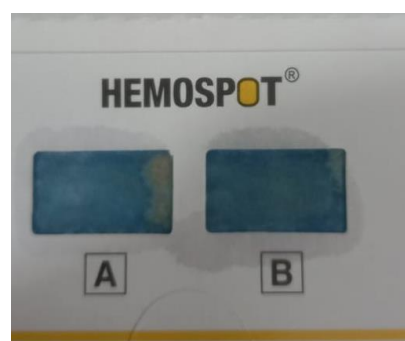
Image: 2 Microcytic hypochromic images



3



4



5

Image 1 is showing the red cells morphology normocytic and normochromic whereas the image 2 showing that red cells are widely spaced and hypochromia with microcytosis. Microcytic hypochromic is evidence of iron deficiency anemia. Image 1 showing predominantly normocytic normochromic picture According to the image 3& 4 is related to parasites present in stool examination under 40x (high power objective) image 5 showing occult blood positive with deep blue color.

The aim of the study was to investigate the parasitic infection among the children age between 1-15 years in particular area of Punjab. In growing age, they need more iron and if there is dietary deficiency that develops the habit of geophagia, due to that children are more prone to catch parasitic infection low synthesis of hemoglobin and if not treated father may deplete the immunity among children. The study shows that there are still 19% infection among low age group. In this study we found the low hemoglobin, alteration red cells morphology, occult blood and parasites directly related iron deficiency in children. The poor hygiene and sanitation conditions are direct contributory factors for high prevalence of the parasitic infestation especially in rural area of developing nation.(20) Findings suggest that there is need to sensitize the parents to maintain the hygienic practices.

4. Conclusion

As such physician recommends the series of the test to evaluate the anemia among children like Hemoglobin, TLC, DLC Platelets, retics film, TIBC, Transferrin etc. Stool and urine examination and sometime bone marrow examination. But according to this study researcher used minimum tool to evaluate the IDA among children, it cost effective and less burden on public.

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Conflict of Interest:

There is no conflict of interest.

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