

## KERATOMALACIA AND INTESTINAL HELMINTHIASIS\*

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Helminthic infestation is common among the rural population of India, especially children. Parasites often produce digestive disturbances, malabsorption, and this leads to the deficiency of various nutrients including fat soluble vitamins. Vitamin A deficiency, specially in association with protein deficit and infective illness, causes night blindness, xerosis of the conjunctiva, Bitot spot, keratomalacia and complete blindness. This deficiency syndrome as a cause of blindness is as important, perhaps more, as smallpox and venereal diseases. An early detection of vitamin A deficiency and effective treatment can reverse the early stages of eye involvement, but once corneal opacity and keratomalacia have taken place, very little can be done short of corneal graft. We have studied 51 children with keratomalacia to find out an association, if present, with helminthiasis and non-specific diarrhoea.

### Material and Methods

Fifty-one cases of keratomalacia seen during the period of 1966 to 1970 constituted the material. Clinical history and physical findings were recorded in every child, and stool and blood examination performed. Plasma proteins were estimated in 17, and a skiagram of the chest was taken in 15.

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### Observations

There were 31 males and 20 females. The youngest patient was a ten-month old girl and the oldest an 11-year old boy. Thirty-three patients were below the age of 5 years.

*Symptoms* All the cases were suffering from loose motions varying from 6-12 in number. The stools were pale, bulky and offensive in 42 cases, contained blood and mucus in 10 cases, mucus only in 20 cases and in 9 cases it was watery. It was greenish or yellowish in colour. Irregular fever of a low grade ranging in duration from 15 days to 10 months was present in 33 (64.7%) cases.

Abdominal distension was present in 15 (29.4%) cases and vomiting was present in 18 (35.3%) cases.

All these patients had features of other deficiencies as well mainly that of vitamin B complex and protein in the form of brown pigmentation of the hair, cheilosis, angular stomatitis, glossitis, swelling of the ankles and feet and even anasarca, in 32 (62.7%) cases in all.

*Investigations.* The stool examination findings are shown in Table I. Abnormal findings were detected in 43 (84.3%) cases. Simultaneous infestation with roundworm and giardia was the most frequent observation.

Haemoglobin ranged from 25-60 per cent of normal. The anaemia was microcytic and hypochromic in all the cases and was mild (haemoglobin 61-69% of normal), moderate (haemoglobin

**Table 1.** *Stool examination findings.*

	No. of cases		
	10 months to 5 years	5½-11 years	Total
Round worm ova	7	18	25
Giardia cyst	4	6	10
Hook worm ova	3	5	8
<i>Entamoeba histolytica</i> cysts	2	3	5
Exudate and malabsorption*	11	17	28
Normal findings	3	4	7

N.B.\* Indicates the presence of pus cells in fair numbers, plenty of starch granules and fat globules. These patients had nonspecific diarrhoea and amongst these 28 cases, 16 showed some other helminthic cyst or ova in stool in addition.

40-60% of normal) and severe (haemoglobin less than 40% of normal) in 12, 30 and 9 cases respectively. Eleven cases had leucocytosis (total white blood cells more than 10,000/c. mm.) and 9 had eosinophilia (total eosinophil count more than 1,000/c. mm.). The concentration of total plasma protein was 4.1-4.9 G.% in 12 and 5.0-5.4 G.% in 5. The level of albumin was 2.1-2.5 G.% in 10 and 2.6-2.9 G.% in 7 and that of globulin was 1.8-2.2 G.% in 11 and 2.3-2.6 G.% in 6 cases.

Urine examination showed the presence of a trace of albumin in 9 cases. Roentgenographic examination of the chest was performed in 15 cases with respiratory tract infection and showed

evidences of nonspecific pneumonitis in 4 and bronchopneumonia in 7 cases.

All cases were given high doses of parenteral vitamin A injection, vitamin B complex and a diet consisting of skimmed milk, lean fish and meat, etc. Anthelmintics were used in appropriate cases. Injection penicillin was given to patients with respiratory tract infection who responded well to anthelmintic and antibiotic therapy given together than when antibiotics were administered alone. Antibacterial treatment with locally acting sulphonamides was highly efficacious in cases with nonspecific diarrhoea. Digestive ferments were given to those who showed the presence of excessive starch granules and fat globules in their stool.

### Discussion

Thirty-one (60.8%) cases of keratomalacia in the present series revealed the presence of one or more of the following intestinal parasites: round worm ova, giardia cysts, hookworm ova and cysts of *Entamoeba histolytica*, as shown in Table 1. Tiwary (1966) reported the incidence of intestinal helminthic infestations to be 95% amongst 1500 cases of keratomalacia and giardia was detected more often than other intestinal parasites. The present study was based on a single routine examination of a saline preparation of the stool. Since many ova and cysts are voided intermittently and in varying numbers the possibility that by doing repeated stool examination and ova concentration method more positive cases could have been detected cannot be ruled out. By using a single examination of faeces Ahmed and Roy (1970) detected intestinal parasites in 50% of cases of hypovitaminosis A

Intestinal worms may produce diarrhoea, malabsorption, liberate toxins, alter the bacterial flora of the gut, produce allergy and occasionally affect the liver. The deficiencies of vitamin A leads to degeneration of the intestinal epithelium and further impairment of vitamin A absorption. No clinical evidence of deficiency of vitamin K was observed in the present study. Ten (19.6%) cases showed some clinical evidence of vitamin D deficiency. All the cases of the present series were suffering from diarrhoea for varying intervals and prior to hospitalisation, their diet was deficient in protein and vitamins A and D. The average duration of loose motions was shorter in cases showing

the presence of intestinal parasites (3.9 months) than in those without parasitic infestation (6.1 months), and while the latter group responded well to parenteral administration of vitamin A, in the former the therapy was supplemented with specific anthelmintic measures.

The occurrence of malabsorption in intestinal parasitic infestations is recognized. Ascariasis interfere with nutrition, and may enter into the pancreatic or bile ducts, thereby leading to malabsorption. Severer lesions of the intestinal wall have been observed where macerated worms have been found in the lumen. Besides giving rise to diarrhoea, giardiasis also leads to malabsorption (Finkelstein 1968). Steatorrhoea and impaired absorption of vitamin A in giardiasis has been attributed to parasites which cover the wall of the intestine interfering with its absorption and accelerating the rate of passage of the digested products through the ileum. Malabsorption occurs in 12-25% of cases with amoebiasis (Misra *et al.* 1966, Pimparker *et al.* 1970). Ankylostomiasis leads to chronic gastrointestinal bleeding with anaemia and even dwarfism, hepatosplenomegaly and hypogonadism (Leaman, 1910) but divergent opinions have been expressed regarding the occurrence of malabsorption. Burman *et al.* (1970) from Chandigarh detected malabsorption in 20% cases of ankylostomiasis and Tandon *et al.* (1966) reported an incidence of 40%. Tandon *et al.* (1969) have also reported a significant association between hookworm ova content and hypoalbuminaemia and malabsorption. However, the mechanism of malabsorption was not clear from

these studies. It seems that ankylostomiasis plays a minor role in the pathogenesis of malabsorption and other factors, such as malnutrition, play a bigger role. Malabsorption has been recorded in primary protein and vitamin malnutrition (Tandon *et al.* 1966, Chuttani *et al.* 1968) and colitis may also lead to the malabsorption syndrome (Roth 1964). Twelve cases of the present series showed the presence of pus cells in fair numbers, plenty of starch granules and fat globules in the stools and another 16 cases with similar findings had evidence of intestinal parasites as well.

It is well known that intestinal parasites liberate toxins and give rise to allergic manifestations and eosinophilia. Fifteen cases had clinical evidence of respiratory tract infection confirmed on roentgenographic examination in 11. Changes in the respiratory tract epithelium due to vitamin A deficiency might be a precipitating factor in producing lung infection in these cases. The respiratory tract infection might have been due to secondary bacterial infection, but in 6 cases, allergic pneumonitis (Loeffler's syndrome) might have played a role as they responded better when treated with antibiotics and anthelmintics than when treated with antibiotics alone and all of them revealed the presence of ascariasis ova in their stools. Loeffler's syndrome may be produced by intestinal worms in their larval stages while migrating through the lung capillaries and may produce intrapulmonary haemorrhages.

### Summary and Conclusion

Fifty-one children with keratomalacia were studied. All of them gave

a history of diarrhoea, the number of loose motions being 6-12 daily. There was associated vitamin B complex and protein deficiency as well.

The stool examination revealed abnormalities in 43 (84.3%) cases including helminthic infestations by round worm, giardia, hook worm and *Entamoeba histolytica* singly or in combination in 33 (60.8%) cases. The average duration of diarrhoea was less amongst cases with helminthic infestation (3.9 months) than amongst cases without parasites (6.1 months).

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