

# WHIPWORM DYSENTERY IN CHILDREN AND ITS TREATMENT WITH DITHIAZANINE IODIDE\*

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The whipworm, *Trichocephalus trichiurus* or *Trichuris trichiura*, is a very common parasite, particularly in humid subtropical regions of the world. Stoll<sup>1</sup> estimated that approximately 355 million people harbour this parasite, yet relatively little attention has been paid to its presence in stools and the tendency has been to regard it as a harmless, non-pathogenic parasite.

In 1927 Fernan Nunez<sup>2</sup> described an 'amoebic-like' dysentery associated with heavy infestation of whipworm and, since 1939, several authors<sup>3-8</sup> have described series of cases where heavy whipworm infestation in children has caused prolonged diarrhoea, with mucoid, sometimes blood streaked, stools, tenesmus and abdominal pain, often complicated by loss of weight, rectal prolapse, and anaemia.

Beaver<sup>9</sup> has drawn attention to the relationship between the worm burden and the severity of symptoms. He has described a technique of counting ova in faecal smears as being a reliable method of estimating the number of worms infesting the host, and has graded the severity of infestation as follows:<sup>10</sup>

Under 5 ova per 1-3 mg. faecal smear	..	light
6-20 ova per 1-3 mg. faecal smear	..	.. moderate
21-50 ova per 1-3 mg. faecal smear	..	.. heavy
Over 50 ova per 1-3 mg. faecal smear	..	.. very heavy.

The whipworm has proved to be an extremely difficult parasite to eradicate. Hexylresorcinol used by mouth and piperazine have been shown to be ineffective. A 0.2% solution of hexylresorcinol given as an enema has been the only effective method of reducing the worm burden.<sup>6</sup> Recently however, a cyanine dye, dithiazanine iodide, administered

orally, has been held to be effective in the eradication of this parasite.<sup>11-14</sup>

## DESCRIPTION OF CASES

A series of 15 children between the ages of 2 and 6 years were treated at King Edward VIII Hospital, Durban, for whipworm dysentery between February and August 1958. Of these, 12 were Indians and 3 were Africans. One of the Africans was a Mohammedan who lived with Indians and from the epidemiological aspect should be grouped with the Indians. The main features of these cases are illustrated in Table I and a brief discussion of the more important symptoms and signs follows.

**Diarrhoea.** Ten children had histories of diarrhoea for more than 2 months, 6 for more than 6 months, and 3 for more than 1 year. In 2 cases the parents were unable to say for how long the diarrhoea had been present. All had had antibiotic treatment for their diarrhoea, many of them on several occasions, without alleviation of symptoms. The 3 cases with short histories had been treated as bacillary dysentery for more than 2 weeks. One had had chloramphenicol, tetracycline, and neomycin before the diagnosis of whipworm dysentery was made. All 15 were investigated for bacillary dysentery and stool cultures were negative. Three children had associated amoebic dysentery which was effectively treated before any attempt was made to eradicate the whipworms.

**Tenesmus and rectal prolapse.** Tenesmus was a prominent symptom in 12 cases, the desire to defaecate being almost constantly present. Recurring rectal prolapse occurred in 8 of these children. Although most of the children were malnourished, 3 of those with rectal prolapse were not.

**Stools.** A characteristic feature of the stools was the excessive amount of mucous exudate. Blood was found only in the stools of the cases in which rectal prolapse was a complication. Fluid stools were present in 9 children, and

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TABLE I. CLINICAL FEATURES ON ADMISSION: CASES 1-15

Case	Race	Age	Sex	Duration of Symptoms (months)		T.t. seen at Sigmoidoscopy	T.t. Ova in Faecal Smear	Hb (g %)
				Diarrhoea	Rectal Prolapse			
				1 .. .. .	I			
2 .. .. .	I	4	F	12+	12	Not done	100+	10.2
3 .. .. .	I		F	3	nil	Not done	103	4.8
4 .. .. .	A*	2	M	1	nil	+	241	11.4
5 .. .. .	I	4	M	7	6	+	569	6.9
6 .. .. .	A	6	F	6+	nil	+	382	7.6
7 .. .. .	A	4	M	1/4	nil	-	35	12.2
8 .. .. .	I	6	M	24	2	+	215	9.8
9 .. .. .	I	6	F	3/28	nil	+	230	5.6
10 .. .. .	I	3	F	2+	1	-	62	12.0
11 .. .. .	I	4	M	2+	3/4	+	56	6.3
12 .. .. .	I	3	M	6+	6	+	76	10.2
13 .. .. .	I	2	F	?	nil	Not done	92	12.3
14 .. .. .	I	3	M	6+	2	+	273	9.8
15 .. .. .	I	5	F	?	nil	Not done	80	7.2

\* Mohammedan faith living with Indians.

in the remaining 6 the stools were loose and had a somewhat 'crumbly' appearance.

**Sigmoidoscopy.** Sigmoidoscopy was performed in 11 cases, in 9 of which numerous whipworms were seen attached to the mucosa of the rectum and sigmoid colon. The intervening mucosa appeared normal, but the flow of mucus was remarkable. The 3 cases which had been treated previously for amoebic dysentery showed no evidence of ulceration.

**Ovum-counts.** Beaver's method<sup>9</sup> of counting ova in simple faecal smears was used to estimate the severity of infestation. The initial figures shown are the average counts of 3 smears made from different samples of stool before treatment.

**Blood findings.** Only 6 cases had haemoglobin levels over 10 g.%, the highest level being 12.3 g.%. In 9 cases there was evidence of iron-deficiency anaemia. One case

with coincident pulmonary tuberculosis had a normochromic normocytic anaemia with a haemoglobin of 7.6 g.%.

TREATMENT

Before dithiazanine iodide became available 4 cases were treated with 0.2% hexylresorcinol enemata. The results are set out in Table II. Although this treatment brought about symptomatic improvement in 3 cases it did not eradicate the whipworms. Of the 4 cases, 2 became reinfested and were subsequently treated with dithiazanine iodide; the 3rd case did not return for follow-up, and the 4th was not improved by one enema and as the dithiazanine iodide was now available he was not given a second enema.

The results of treatment with dithiazanine iodide in 14 cases are illustrated in Table III. Treatment was satisfactory in 13 cases and failed to cure 1 case. In 12 of the cases the drug was given for 5 days in a daily dosage of 20 mg. per

TABLE II. RESULTS OF TREATMENT WITH 0.2% HEXYLRESORCINOL ENEMATA ON THE STOOLS OF 4 CASES

Case	Hexyl-resorcinol Enemata	Stools Before Treatment			Stools 5 Days After Treatment		
		Macroscopic	Exudate	T.t. Ova	Macroscopic	Exudate	T.t. Ova
		1 .. .. .	1	Fluid	+++	+++	Formed
2 .. .. .	1	Fluid	++	100+	Semiformed	-	50
3 .. .. .	2	Semiformed	++	78	Semiformed	-	29
4 .. .. .	3*	Semiformed	+	103	Formed	-	134
5 .. .. .	1	Fluid	+++	241	Fluid	++	21
6 .. .. .	1	Fluid	+++	241	Fluid	++	267

\* 48 days after completion of course 2

TABLE III. RESULTS OF TREATMENT WITH DITHIAZANINE IODIDE IN 14 CHILDREN: FOLLOW-UP EXAMINATIONS SHOWN ARE THOSE DONE 10 DAYS AFTER EACH COURSE OF TREATMENT

Case	Before Treatment			First Treatment			Second Treatment			Third Treatment		
	Macroscopic	Exudate	T.t. Ova	Macroscopic	Exudate	T.t. Ova	Macroscopic	Exudate	T.t. Ova	Macroscopic	Exudate	T.t. Ova
1 .. .. .	Semiformed	+	115	Formed	+	9	Formed	-	0			
2 .. .. .	Fluid	++	134	Formed	-	0						
4 .. .. .	Fluid	++	267	Formed	+	0						
5 .. .. .	Fluid	+++	569	Formed	-	0						
6 .. .. .	Fluid	+++	382	Formed	+	9	Formed	-	0			
7 .. .. .	Semiformed	++	35	Formed	-	2						
8 .. .. .	Fluid	++	215	Formed	-	0						
9 .. .. .	Fluid	+++	230	Semiformed	+	143	Formed	+	73	Semiformed	+	144
10 .. .. .	Fluid	+++	62	Formed	+	6						
11 .. .. .	Semiformed	++	56	Semiformed	+	0						
12 .. .. .	Fluid	+	76	Semiformed	+	10	Formed	-	17			
13 .. .. .	Semiformed	++	92	Semiformed	-	17						
14 .. .. .	Semiformed	+++	273	Fluid	-	79	Semiformed	++	230	Formed	-	0
15 .. .. .	Semiformed	+	80	Semiformed	-	0						

lb. body-weight in 3 divided doses, the maximum dosage being 600 mg. per day. The other 2 cases were treated for 7 days.

This treatment proved effective in eradicating whipworm ova from the stools in 6 cases, caused a reduction to non-pathogenic levels in 6 cases, and failed in 2 cases. A second course of the drug was required in 4 cases before the whipworm ova were entirely eliminated.

One case failed to respond to treatment despite three 5-day courses of dithiazanine iodide. After the first two courses the ovum-count had been reduced by more than 50% but, after a third course, there were still more than 100 ova per smear. The stool was still semi-formed, but the

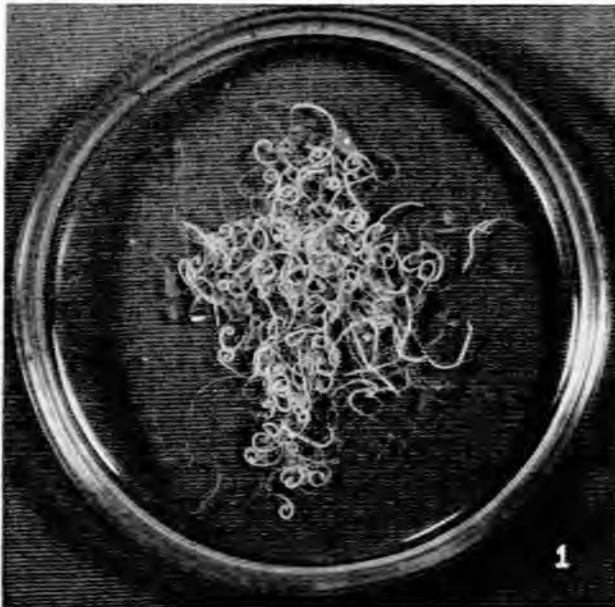


Fig. 1. 154 whipworms recovered from a single stool passed 24 hours after commencement of treatment with dithiazanine iodide.

frequency of defaecation was less. Whilst under treatment the child passed more frequent fluid stools than before. She was possibly sensitive to the drug, and probably the rapid passage of dithiazanine iodide through her large bowel did not allow long enough contact with the whipworms for effective treatment.

In another case, which had a massive infestation, the ovum-count was reduced by more than 50% after a 7-day course of treatment, but symptomatic improvement was minimal. A second course of treatment over 5 days resulted in no further improvement. He was given a third course of treatment lasting 10 days, which resulted in complete eradication of ova from his stools.

Symptomatic improvement in the majority of cases was rapidly achieved; 12 of the 14 cases began passing more formed and less frequent stools before the 5th day of treatment, and dead whipworms appeared in the stools from the 2nd day of treatment. Ovum-counts began falling on the 3rd or 4th day.

Only 4 of the earlier cases have been seen for follow-up more than 1 month after discharge and all 4 of these children were well. They had respectively 0, 1, 4 and 5 ova per faecal smear.

#### INCIDENCE

During the 7 months under discussion just over 17,000 children attended the Out-patient Department of King Edward VIII Hospital. Of these the proportion of Indian to African children was approximately 1 to 5. The incidence of whipworm dysentery was therefore approximately 4 Indians and 0.15 Africans per 1,000 sick children.

In a control series of 59 Indian and 55 African children between the ages of 1 and 6 years, with no history of diarrhoea and whose stools were normal in frequency and consistency, specific examination for whipworm ova revealed

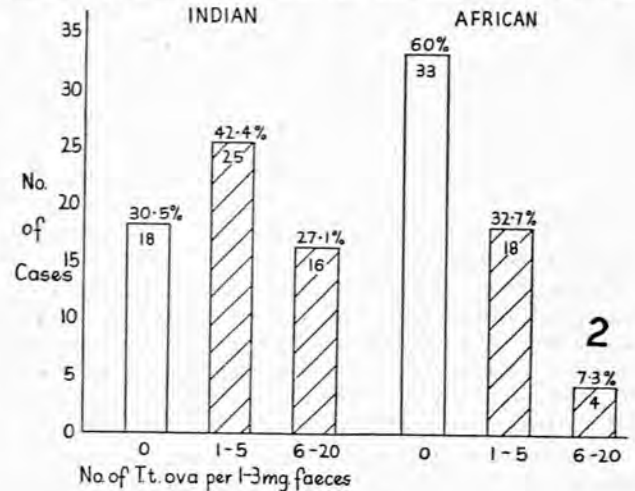


Fig. 2. Incidence and number of *T.t.* ova in the stools of normal Indian and African children 1-6 years of age.

the findings illustrated in Fig. 2. It will be noted that whipworm ova were present in 69.5% of the Indian children and 40% of the African children. In 21.7% of the Indian children the ovum-counts were more than 5 per smear, as compared with 7.3% of the African children.

It would appear, therefore, from this small study that whipworm dysentery and infestation are commoner in the Indian than the African child. This may be explained by the fact that Durban Indians grow their own vegetables, which are fertilized with their own faeces.

#### DISCUSSION

The life cycle of the whipworm is very simple.<sup>15</sup> Ova passed in human faeces require 3-4 weeks in damp soil or water to embryonate and become infective. Once ingested the shells of the embryonated ova are destroyed by the digestive enzymes of the host, and the larvae are released. In about 1 month these become sexually mature adults in the large bowel. There is at no stage a visceral invasion.

The warm humid conditions of the Durban climate are ideal for the proliferation of whipworms. In a survey of African adult males, Elsdon-Dew and Freedman<sup>16</sup> demonstrated that 61.9% of those resident in Durban for more than 2 years passed whipworm ova, whereas only 30.45% of those arriving in Durban for the first time were infected.

It has been estimated<sup>6</sup> that the output of ova per female whipworm may be as high as 300 per c.c. of faeces. Thus in 10 c.c. of stool passed by a child harbouring 10 female whipworms, there may be 30,000 ova—all potential whipworms for a child who eats the wrong piece of dirt.



Although fatal cases of whipworm infestation have been described, death is a rare complication. The two earliest reports of fatal cases found in the literature were from Switzerland in 1907<sup>17</sup> and from the Philippines in 1908.<sup>18</sup> Nevertheless, the serious constitutional upset, detrimental both to the physical and psychological development of the young child, produced by massive infestation with this parasite warrants vigorous treatment. Although not a common cause of dysentery, whipworm infestation must be borne in mind whenever a child presents with a history of prolonged diarrhoea, tenesmus, and recurring rectal prolapse.

The 8 cases, all Indian, which presented with rectal prolapse form a high proportion of the total number of Indian children with rectal prolapse seen at King Edward VIII Hospital during this period.

Whipworm infestation, therefore, should always be considered in the differential diagnosis of rectal prolapse. Ovum-counts are easily done and give an indication of the severity of the infestation, and proctoscopy will reveal the whipworms in most cases.

Treatment with hexylresorcinol enemata not only involves hospitalization of the patient, but also an unpleasant technique fraught with the danger of severe burns if the solution is allowed to come into contact with the skin.

Dithiazanine iodide has proved to be an effective drug for the eradication of whipworms. The recommended daily dosage of 20 mg. per lb. body-weight appears to be adequate, but recent reports<sup>13,14</sup> recommend that courses should be extended to 7-10 days. Repetition of courses in this series might have been obviated had longer courses been used initially, especially in the cases with massive infestations. No preparation of the patient is required before using dithiazanine iodide, and the majority of cases can be treated at home.

Side-effects due to gastro-intestinal irritation may be encountered, but Swartzwelder *et al.*<sup>13</sup> reported no side-effects serious enough to warrant the discontinuation of

treatment in over 400 cases, some of which were treated for 21 days. In the present series one child exhibited some intolerance to the drug.

As dithiazanine iodide is not absorbed, the stools are coloured blue or green. This forms a useful indication whether the child is receiving his treatment.

#### SUMMARY

Fifteen cases of dysentery in children caused by heavy whipworm infestation are described.

Satisfactory results of treatment with dithiazanine iodide are discussed.

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