

PIPERAZINE IN TREATMENT OF HOOKWORM INFECTION

BY

L. G. GOODWIN, M.B., B.S.

AND

O. D. STANDEN, D.Sc.

From the Wellcome Laboratories of Tropical Medicine, London

The efficacy of piperazine salts in the treatment of threadworm and roundworm infections is now well established. Their value in other helminth infections of man is less well substantiated. Dunn (1955) describes piperazine adipate as effective against *Trichuris trichiura*; Shafei (1955) reports piperazine citrate as effective against *Trichuris trichiura*, *Trichostrongylus*,

and *Hymenolepis nana*; Nagaty, Rifaat, and Salem (1955) describe successful treatment with piperazine adipate and citrate against *Trichostrongylus* and *Heterophyes* but failure against *Ancylostoma*, *Hymenolepis nana*, and *Taenia saginata*.

The present report concerns three African children infected with *Ancylostoma duodenale*, who were kept under observation for nearly four weeks at the Medical Research Council Hospital, Fajara, Gambia. Two were treated with piperazine salts, and all were finally treated with tetrachlorethylene. Egg counts were made for several days before treatment, in order to estimate the daily variation of egg output, by the method of Caldwell and Caldwell (1926). A Macdonald pipette was used for sampling the faecal suspensions.

Case Reports

Case 1.—A boy aged 8 was heavily infected with hookworm and severely anaemic. Egg counts were made daily for 11 days, and he was then treated with 900 mg. of piperazine adipate three times daily for seven days. Follow-up continued for three days after completion of the course. No significant reduction in egg output was seen by this time, and 2 ml. of tetrachlorethylene was therefore given.

Case 2.—A boy aged 11 was lightly infected with hookworm and concurrently with roundworm. Egg counts were made daily for 10 days, and he was then treated with 1 g. of piperazine phosphate three times daily for seven days. The roundworms were expelled, but follow-up for four days after treatment was completed showed no significant reduction in hookworm ova. He was then given 2 ml. of tetrachlorethylene.

Case 3.—A male child aged 6 months was heavily infected with hookworm. Piperazine treatment was not given, but he later had 0.25 ml. of tetrachlorethylene.

Results

In all three children there was great daily variation in the number of hookworm eggs contained in the stools (see Charts). Neither patient treated with piperazine showed any significant decrease in egg count at the end of the course of treatment. After the single dose of tetrachlorethylene the egg counts were reduced to nil in 24 hours and remained so during the two to four days of follow up. Case 3, which showed similar daily variation in egg output in the absence of piperazine, also responded to treatment with tetrachlorethylene. Piperazine adipate or phosphate had no significant therapeutic effect against these two cases of hookworm infection.

It seems clear that trials of drugs of doubtful efficacy against hookworm or other helminth infection, where activity is related to numbers of eggs per gramme of faeces, must be preceded by a sufficient number of daily stool examinations in order to assess individual variation. The arbitrary selection of any two points in the accompanying graphs, before and after treatment with piperazine, might lead to highly erroneous conclusions.

Summary

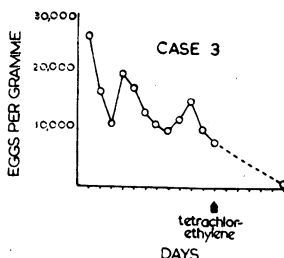
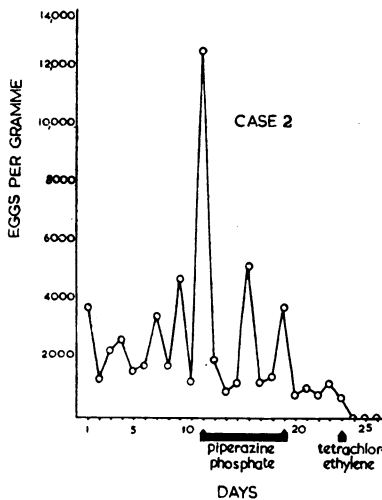
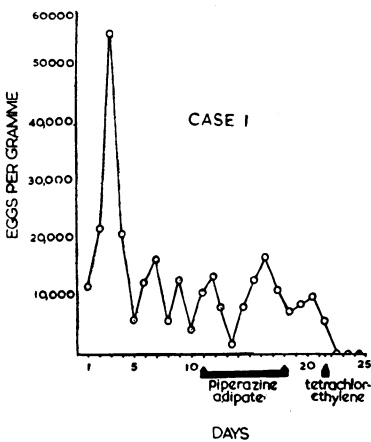
Piperazine adipate and phosphate were tested in patients infected with hookworms. No curative effect was observed. Subsequent treatment with tetrachlorethylene was fully effective.

Daily egg counts varied considerably before, during, and after treatment.

We are indebted to the Medical Research Council for providing facilities at Fajara and to Dr. Albert Davies for his invaluable co-operation.

REFERENCES

Caldwell, F. C., and Caldwell, E. L. (1926). *Amer. J. Hyg.*, 6, Suppl. p. 146.
 Dunn, T. L. (1955). *Lancet*, 1, 592.
 Nagaty, H. F., Rifaat, M. A., and Salem, S. (1955). *Ibid.*, 2, 827.
 Shafei, A. Z. (1955). *Ibid.*, 2, 827.



Daily variation in hookworm eggs per gramme of faeces before, during, and after treatment of three cases with piperazine and tetrachlorethylene.