Acta Médica Cost. 9(1)9-11; 1966

The Treatment of Ascaris lumbricoides and Enterobius vermicularis with Combination Drug Composed of Pyrvinium Pamoate and Piperazine

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The effectiveness of piperazine against *Ascaris lumbricoides,* the large intestinal roundworm, has been well documented (1-3) as has the therapeutic value of pyrvinium against the common pinworm, *Enterobius vermicularis* (4-7).

A pleasant tasting formulation, both in suspension and chewable lozenges, was developed to incorporate the individual therapeutic qualities of pyrvinium against pinworms and piperazine against roundworms into a single convenient combination.

This is a report on the efficacy and tolerance of the combination drug hereafter designated as CI-578, when given in a single dose on 2 successive days.

MATERIALS AND METHODS

Patients infected with *Ascaris lumbricoides* were egg-counted on the 2 successive days before treatment using a modification of the Ritchie-Frick egg dilution technique (8). The alcohol-buffer solution was replaced with 5% Formalin since the former is neccessary only if the concentration of parasites is to follow, a part not employed in this study. Patients, likewise, were checked for pinworms on the 2 successive days before treatment by the cellulose-tape technique. Both egg counting and cellulose-taping were continued on post-treatment days 7, 8, 14, and 15. The percentage egg reduction was determined by comparing averaged post-treatment egg counts with averaged pre-treatment counts. Pinworm infections were noted as being positive or negative following treatment.

Each ml. of CI-578, in syrup form, contained pyrvinium pamoate equivalent to 5 mg. of base and both piperazine citrate and andhydrous piperazine equivalent to 150 mg. piperazine hexahydrate. Chewable lonzenges were so constituted that each tablet contained the equivalent of 25 mg. pyrvinium pamoate and piperazine phosphate equivalent to 750 mg. piperazine hexahydrate. Syrup was

administered to all patients under 11 yrs. of age at the dosage level of 0.5 ml/kg/day on 2 successive days, the total daily dose per patient not exceeding 25 ml. Chewable lozenges were administered at 0.1 tablet/kg/day on 2 successive days with adjustments made to the nearest whole number for administration of whole tablets. The total daily dose per patient did not exceed 5 tablets.

RESULTS

A total of 47 patients were treated with 41 completing the study, 6 failing to return for post-treatment examinations. Results are indicated in Table I.

TABLE I

Results of Treatment with CI-578 of A. lumbricoides and E. vermicularis in Single or Double Infections

Ascaris lumbricoides		*Enterobius vermicularis*		*A. lumbricoides & E. vermicularis*		
Patients	%-Egg Reduction	Patients	Pos. or Neg.	Patients	Reduction %-Egg	Pos. or Neg
6	100.0	9	Neg.	3	100.0	Neg.
Syrup						
1	95.2	1	Pos.	1	90.0	Neg.
1	87.5			1	56.1	Neg.
15	100.0	1	Neg.	1	100.0	Neg.
Tablets						
1	93.3					

DISCUSSION

Among the patients screened for study difficulty was encountered in finding double infections. Though data are meager, CI-578 appears to show activity in markedly reducing the worm burden of both *Ascaris* and *Enterobius* when used in the syrup form. The one case of a double infection in which tablets were used was cured, thus suggesting further investigation.

The effectiveness of CI-578 is further substantiated by the results obtained against single infections with either parasite. Although a significant worm reduction suffices to evaluate a worm medicine as being efficacious for *Ascaris*, this study indicates a high cure rate as well for both *Ascaris* and *Enterobius*. Of 17 patients treated for pinworms only one failed to be cured while 25 patients out of 29 or 86% were cured of roundworms with a significant reduction in worm burden noted in the remaining 4 patients.

Nearly all of the patients in this study suffered from other parasitic infections as well as malnutrition. Accordingly, symptomatology was difficult to evaluate since gastrointestinal complaints were prevalent. However no cases of vomiting were noted and in general symptomatology subsided following therapy. There was no refusal on the part of anyone to continue therapy after the 1st day of treatment.

Although egg and larval counts were not performed on other worm infections, no noticeable effect was observed against *Trichuris trichiura,* hookworms, *Hymenolepis nana* and *Strongyloides stercoralis.* Such a conclusión however, awaits critical study.

CONCLUSIONS

CI-578, a combination drug, shows marked activity against both *Ascaris lumbricoides* and *Enterobius vermicularis* when treated singly or in double infections. Only one failure in curing pinworms infections occured out of 17 patients treated. A cure rate of 86% was achieved against *A. lumbricoides* with a significant reduction in worm burden occuring among the 4 remaining cases.

Grateful acknowledgement is made to Parke, Davis & Co. for supplying the drug CI-578 and supporting this study and to the Sisters of Mercy, attending physician and staff of the Hospital in San Vito de Java for their cooperation.

RESUMEN

CI-578, una combinación de piperazina y pyrvinium dada en una sola dosis en dos días sucesivos, muestra gran actividad contra Ascaris lumbricoides y Enterobius vermicularis ya sean tratadas aisladamente o en infecciones dobles. Ocurrió sólo un fracaso en el tratamiento de infecciones por Enterobius en 17 pacientes. Contra Ascaris lumbricoides se logró una tasa de curación de 86% y en los 4 casos restantes ocurrió una reducción importante de la infección.

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