EPIDEMIOLOGY AND CONTROL OF INTESTINAL PARASITES WITH NITAZOXANIDE IN CHILDREN IN MEXICO

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Abstract. The purpose of this study was to evaluate the efficacy and the tolerance of nitazoxanide in children as a single broad-spectrum antiparasitic agent in the treatment of mixed parasite infections with both intestinal protozoa and helminths. Two hundred seventy-two children (age range = 2–14 years) participated in this study. We systematically surveyed every household head using questionnaires designed to obtain information about household socioeconomic status and hygiene. Parasitic infections were confirmed by three stool examinations using direct smear, Ferreira concentration, and cold acid-fast Kinyoun staining methods. One hundred twenty-one (44%) children tested positive for protozoa such as *Giardia* lamblia (18%), *Entamoeba histolytica*/*E. dispar* (10%), Blastocystis hominis (7%), *Cryptosporidium parvum* (4%), and *Cyclospora cayetanensis* (3%), and helminths such as *Hymenolepis nana* (10%), *Trichuris trichiura* (6%), and *Ascaris lumbricoides* (6%). There were also two cases of infection with *Enterobius vermicularis*. After a complete physical examination was performed, 121 patients received treatment with nitazoxanide. Overall, 84% of the protozoa and 95% of the helminths were completely eliminated from the patients. Nitazoxanide was very well tolerated, with no serious adverse effects reported.

Nitazoxanide is a new 5-nitrothiazole derivative with broad spectrum anthelmintic and antiprotozoan activity. It has been shown to be effective against infections with *Ascaris lumbricoides*, *Trichuris trichiura*, *Taenia saginata*, *Hymenolepis nana*, and *Fasciola hepatica*, as well as infections with common protozoa such as *Cryptosporidium parvum*, *Blastocystis hominis*, *Entamoeba histolytica*, *Giardia lamblia*, and *Isospora belli*. This drug is also well tolerated, with only minor clinical side effects such as abdominal pain (4% of patients) being observed.5,6

The purpose of the present study was to evaluate the efficacy and the tolerance of nitazoxanide in children as a single broad spectrum antiparasitic agent in the treatment of mixed parasite infections with both intestinal protozoa and helminths. Our study was conducted to determine the prevalence and nature of intestinal parasitic infections in children from Coacalco de Berriozabal (population = 240,000), which is located northeast of Mexico City.

Two hundred seventy-two children (age range = 2–14 years) from 85 families participated in the study. Stool samples were collected from March 1997 to January 1998. Cases were defined as boys and girls with stool samples positive for three fecal parasites in pediatric hospitals in Mexico.

<table>
<thead>
<tr>
<th>Number of children (%)</th>
<th>Total</th>
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<tbody>
<tr>
<td>Single</td>
<td>84 (69)</td>
</tr>
<tr>
<td>Multiple</td>
<td>37 (31)</td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
</tr>
<tr>
<td>Protozoa + protozoa</td>
<td>13 (11)</td>
</tr>
<tr>
<td>Helminth + helminth</td>
<td>5 (4)</td>
</tr>
<tr>
<td>Protozoa + helminth</td>
<td>19 (16)</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
</tr>
</tbody>
</table>

One hundred twenty-one (44%) children tested positive for protozoa such as *Giardia lamblia* (18%), *Entamoeba histolytica*/*E. dispar* (10%), Blastocystis hominis (7%), *Cryptosporidium parvum* (4%), and *Cyclospora cayetanensis* (3%), and helminths such as *Hymenolepis nana* (10%), *Trichuris trichiura* (6%), and *Ascaris lumbricoides* (6%). There were also two cases of infection with *Enterobius vermicularis*. Of the 121 parasite-positive patients, 84 (69%) had a single parasitic infection, 37 (31%) had mixed infections involving two or more parasites (Table 1), and one had infections with eight different organisms.

Results of the physical examinations showed that 103 (85%) children had abdominal pain, 76 (63%) had meteorism, 47 (55%) had flatulence, 52 (43%) had anorexia, 52 (43%) had irritability, 44 (36%) had diarrhea, 43 (35%) had nausea, 42 (35%) had anal itching, 42 (35%) had hyporexia, and 38 (31%) had asthenia as clinical manifestations before treatment. Clinical manifestations were less common in children less than six years old and more common in children 6–12 years old.

The efficacy rate following treatment with nitazoxanide was determined as the percentage of children with three fecal samples negative by the three methods used (87.6%, 106 of 121). This criterion is used for all intestinal parasites in pediatric hospitals in Mexico.

Nitazoxanide was highly effective against either single or mixed infections with *C. parvum*, *T. trichiura*, and *A. lumbricooides* (Table 2). In 28 patients infected with *H. nana*, cures rates of 84% were observed following three treatments.

The parasitologic response rates observed for *G. lamblia* were similar to those previously reported.5,10 *Blastocystis hominis* and *E. histolytica* were found in three patients after
first treatment. However, nitazoxanide has been reported to be highly effective against these parasites.

An evaluation of the intensity of helminth infections based on egg counts showed that most of the cases were light infections. Only three of 16 cases of A. lumbricoides and five of 28 cases of infection with H. nana were moderate infections. All cases of infection with T. trichiura and A. lumbricoides showed the presence of eggs after treatment. Cases of infection with H. nana that were not cured after treatment were considered moderate infections; however, eggs counts were significantly reduced.

Despite resistance to nitazoxanide that has been observed in some organisms (e.g., G. lamblia and C. cayetanensis), this drug appears to show good efficacy in the treatment of intestinal parasitic infections, with little variation in parasite sensitivity. Thus, it could be used during massive chemotherapy campaigns. These results are consistent with those previously reported, and both show that nitazoxanide is highly effective and well tolerated (only 3% of the patients reported minor clinical side effects) in treating infections with helminths and protozoa.

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**REFERENCES**


