Successful treatment of niclosamide- and praziquantel-resistant beef tapeworm infection with nitazoxanide

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Introduction

Beef tapeworm (Taenia saginata) infection is acquired by eating inadequately cooked beef that contains the larvae or cysticerci of T. saginata. It is found worldwide and about 45 million suffer from this disease. Its greatest economic impact, however, is within tropical and sub-tropical cattle rearing countries: Africa, the Middle East, Central and South America, Europe, and Asia.

Although many antimicrobial drugs are used to treat T. saginata infections, niclosamide and praziquantel have proved effective for its treatment; however treatment failures are well known. We report herein the results of nitazoxanide therapy.

Methods: A prospective study was conducted in 18 children and 34 adults to assess the efficacy and safety of nitazoxanide in the treatment of niclosamide- and praziquantel-resistant T. saginata infection. Nitazoxanide was administered twice daily for 3 days in 500-mg doses for those aged over 14 years and at 20 mg/kg body weight/day in children aged 5–14 years. Post-treatment follow-up was undertaken at 1, 2, 4, 8, and 12 weeks for fecal samples for proglottides, and to check the presence, number, and viability of Taenia eggs.

Results: Nitazoxanide cured 51 of 52 (98.1%) patients. Mild side effects occurred in seven patients, which resolved spontaneously. There were no abnormalities in laboratory parameters.

Conclusions: Nitazoxanide is a safe, effective, inexpensive, and well-tolerated drug for the treatment of niclosamide- and praziquantel-resistant beef tapeworm infection.

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failures are well known.1–4 In Kashmir, India, with a 95% Muslim population and absence of pigs, T. saginata is endemic but Taenia solium infection is almost unknown. We report herein the results of nitazoxanide therapy in 52 patients, identified in a population-based epidemiological survey, infected with T. saginata resistant to multiple courses of niclosamide, praziquantel, or both.

Materials and methods

Between 2004 and 2005, an epidemiological survey for taeniasis was conducted in Sonawari tehsil in the district of Baramulla, Kashmir, India involving 8894 persons from semi-urban and urban villages. During this survey 55 persons with confirmed T. saginata infection resistant to multiple courses of niclosamide or praziquantel or both were identified. Three patients were excluded because one was pregnant and two were lactating. The remaining 52 gave written informed consent to participate in the study. There were 18 children, 24 men, and 10 women. They ranged in age from 5 to 65 years, with a mean of 26.2 ± 16.1 years. The duration of infection ranged from 8 months to 15 years with a mean of 3.7 ± 3.1 years. All patients had received two to seven courses (median three) of niclosamide and 10 had received one to three courses of praziquantel (median two) but had continued to pass proglottides with stools. All had demonstrated a relapse 3–6 weeks after initiation of treatment. Symptoms included passage of proglottides in stools and/or eggs with a cure rate of 98.1% (51 of 52 patients). Nine (5%) patients reported by patients were mild and resolved easily without any treatment. In two previous clinical studies in patients infected with T. saginata, nitazoxanide cured 21 of 22 patients (95.5%) and five of five patients (100%).5,6 Taenia saginata infections are endemic in Kashmir, India. Niclosamide or praziquantel are safe and effective drugs for its treatment but therapeutic failures with these drugs are encountered.

Taenia is not only a significant public health problem but also an important economic problem in endemic areas. It is becoming increasingly clear that it should be given greater priority because of its economic impact, particularly in resource-poor countries. Most patients are asymptomatic and become aware of the infection when they notice proglottides or segments of tapeworm in stools or motile proglottides emerging from the anus, in trousseau, while bending, running or washing. 

Nitazoxanide was administered twice daily for 3 days in 500-mg doses for those aged over 14 years and 20 mg/kg body weight/day in children aged 5–14 years without prior fasting or laxative use.

All patients underwent physical examination including analysis of hemogram, serum chemistry (liver function tests, glucose, urea, sodium and potassium), and urine, and electrocardiogram before and 7 days after treatment. Stool specimens were collected for routine examination. Egg viability was tested by staining with methylene blue, and egg count by Stoll’s method. Patients were followed at 1, 2, 4, 8, and 12 weeks for the passage of proglottides, and fecal samples were examined for the presence, number, and viability of Taenia eggs. Overall 51 of 52 patients (98.1%) responded and passed worms ranging from 1 to 6 meters in length, but no worm contained scolex. All responders stopped passing proglottides at a median of 3 days (range 1–5 days). Of the 41 patients who provided stool specimens in the first week, 38 (92.7%) had negative stool examinations for proglottides and eggs. The reduction was in excess of 98% in egg count and from a median of 100% to 0% in viability at 1 week. Subsequent stool examinations at 2, 4, 8, and 12 weeks were negative for proglottides and eggs with a cure rate of 98.1% (51 of 52 patients).

Thirty-two patients (15 children and 17 adolescents and adults) were positive for another parasite in stool at study enrollment. These included Ascaris lumbricoides (n = 19), Trichuris trichiura (n = 6), Giardia lamblia (n = 4), and mixed infections (n = 3). Nitazoxanide cured 89.5% (17/19), 100% (6/6), 75% (3/4), and 66.7% (2/3) of the cases of ascariasis, trichuriasis, giardiasis, and mixed infections, respectively. Eleven adverse events occurred in seven patients including diarrhea (n = 3), mild abdominal pain (n = 3), headache (n = 2), nausea (n = 2), and giddiness (n = 1). All adverse events were mild and transitory in nature and resolved spontaneously without discontinuation of treatment. No abnormality was observed in hemogram, blood chemistry values, or urine analysis.

Discussion

The present study demonstrated that a 3-day course of nitazoxanide cured 98.1% of patients infected with T. saginata unresponsive to niclosamide, praziquantel, or both. Nitazoxanide was safe and well tolerated. Adverse events reported by patients were mild and resolved easily without any treatment. In two previous clinical studies in patients infected with T. saginata, nitazoxanide cured 21 of 22 patients (95.5%) and five of five patients (100%).5,6 Taenia saginata infections are endemic in Kashmir, India. Niclosamide or praziquantel are safe and effective drugs for its treatment but therapeutic failures with these drugs are encountered.

In conclusion nitazoxanide is a safe, effective, and inexpensive drug for the treatment of niclosamide- and praziquantel-resistant T. saginata infections. It represents a significant addition to the antiparasitic arsenal in the treatment of intestinal parasitic infections.

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References


