

# TREATMENT OF PARASITIC INFECTIONS IN THAILAND

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## INTRODUCTION

Chemotherapy of intestinal parasites and trematode infections excluding schistosomiasis were recently reviewed by Bunnag and Harinasuta (1981b, 1984). Only the treatment of parasitic infections excluding malaria with reference to clinical experience and practice in Thailand are presented herein. Parasitic infections still cause major public health problems in Thailand for helminthological surveys in the rural population, by Kato's thick smear technique revealed that 55% of them were infected with one or multiple helminths (Preuksaraj *et al.*, 1982).

### Protozoan infections

**Amoebiasis:** Nitroimidazole derivatives are the drugs of choice in the treatment of invasive amoebiasis, and emetine and dehydroemetine are less frequently used (Charoenlarp, 1985). Metronidazole at the dosage of 800 mg thrice daily for five days, or tinidazole at the dosage of 2 gm daily for 3-5 days are recommended in symptomatic intestinal amoebiasis, and diloxanide furoate at the dosage of 500 mg thrice daily for 10 days in cyst passers. Mebendazole at the dosage of 50 mg/kg daily for five days gave a cure rate of 67% in the cyst passers (Chongsuphajaisiddi *et al.*, 1971).

In amoebic liver abscess, the dosage of nitroimidazole could be reduced, only a

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single dose of 1.2-2.4 gm of metronidazole (Bunnag *et al.*, 1975) or 2 gm of tinidazole (Vanijanonta *et al.*, 1985b) is adequate. Aspiration is recommended in large abscesses (Harinasuta and Bunnag, 1985).

**Giardiasis:** In primary infection it may be self-limiting but in prolonged or repeated infections it may damage the intestinal mucosa. A single dose of 2 gm of tinidazole or ornidazole gave a cure rate of 90% (Sabcharoen *et al.*, 1980; Suntornpoch and Chalittamrong, 1981). Metronidazole is less effective.

**Trichomoniasis:** A single dose of 2 gm of metronidazole is highly effective. A single 2 gm dose of tinidazole or ornidazole gave cure rate of more than 90% (Chaisilwattana *et al.*, 1980).

**Primary amoebic meningo-encephalitis:** The chemotherapy of *Naegleria* spp. is disappointing (Jariya *et al.*, 1983), but amphotericin B should be tried.

**Leishmaniasis:** It has been reported among Thai workers returning home from the Middle East. A case of visceral leishmaniasis (Kala-azar) was cured by intravenous injections of sodium stibogluconate (Pentostam) 10 mg/kg daily for 30 days (Chutabuddhi and Siripool, 1986).

The majority of skin lesions in cutaneous leishmaniasis are generally self-healing. If the lesions are large or multiple, particularly secondarily infected, sodium stibogluconate at the dosage of 10 mg/kg should be given daily for 10 days. A single daily dose of 400 mg of ketoconazole or metronidazole at the

dosage of 250 mg thrice daily for 30 days may be used as an alternative drug (Polnikorn and Viravan, 1985).

### Helminthic infections

**Nematode infections:** Piperazine salts are used less frequently due to availability of newer drugs in intestinal nematode infections.

**Ascariasis:** A single dose of 150 mg of levamisole or 10 mg/kg of pyrantel pamoate is the drug of choice. Mebendazole (Chongsuphajaisiddhi *et al.*, 1978) and albendazole (Chitchang *et al.*, 1983) are also found to be highly effective.

**Hookworm disease:** In Thailand more than 90% of hookworm sp. are *Necator americanus*. Mebendazole at the dosage of 100 mg twice daily for three days (Bunnag *et al.*, 1978; Migasena *et al.*, 1978) or a single dose of 400 mg of albendazole (Viravan *et al.*, 1982) gave an efficacy of approximately 95% egg reduction but flubendazole in two doses of 300 mg at 12 or 24 hour intervals gave only approximately 50% egg reduction (Bunnag *et al.*, 1980). Pyrantel pamoate at the dosage of 20 mg/kg daily for two days gave 63-83% egg reduction (Bhaibulaya *et al.*, 1975; Migasena *et al.*, 1978).

Tetrachlorethylene at a single dose of 0.1 ml/kg was found to be highly effective (99% egg reduction) but the side-effects, transient nausea and dizziness were common (Migasena *et al.*, 1978). The cost of the drug is very low.

Ma-klua (*Diospyros mollis*) at the dosage of one fruit for each year of life (maximum, 25 fruits) gave a good result (Sadun and Vajrasthira, 1954). The juice is prepared by pounding the fruits and then straining with 15-30 ml of lime water or coconut milk. During the mass campaign against intestinal parasites in 1977-1979, about one million people were treated, and 8 cases of optic

atrophy were reported (Limpaphayom *et al.*, 1977). It was probably due to the toxic effect of oxidization during overnight storage of juice or due to overdosage. Thus, the fruit must be greenish without brackish discoloration and the juice should be freshly prepared before use. Its alcoholic extract gave an egg reduction of 96% and the cure rate of 60% (Migasena *et al.*, 1971) but the field trial gave 58-85% egg reduction (Unhanand *et al.*, 1978).

**Trichuriasis:** Mild and moderate infections respond quite well to a single dose of 20 mg/kg of oxantel or 400 mg of albendazole. Mebendazole at the conventional dosage gave 90% egg reduction (Bunnag *et al.*, 1978; Chongsuphajaisiddhi *et al.*, 1978) and flubendazole at the two doses of 300 mg at 24-hour interval gave similar results (Bunnag *et al.*, 1980).

**Strongyloidiasis:** Thiabendazole at the dosage of 25 mg/kg twice daily for three days is the drug of choice. Chitchang *et al.*, (1984b) observed 81% cure rate in the treatment of small children (2-3.5 years old) with a daily dose of 400 mg of albendazole for three consecutive days. Thus, the dosage of albendazole for adult is probably 800 mg/day for three days. Mebendazole at the dosage of 100 mg twice daily for three days gave a cure rate of 37% (Chongsuphajaisiddhi *et al.*, 1978).

**Enterobiasis:** A single dose of 100 mg of mebendazole, or 10 mg/kg of pyrantel pamoate was found to be very effective. Despite its high efficacy, cases get reinfected which necessitates retreatment.

**Capillariasis:** Mebendazole at the dosage of 200 mg twice daily for 3-4 weeks gave 100% cure rate, and a case of capillariasis was cured by administering albendazole at the dosage of 400 mg thrice daily for one week (Bhaibulaya and Kobwanthanakul, 1984).

**Trichinosis:** Thiabendazole at the dosage of 50 mg/kg for 5 days gave clinical improvement in mild and moderate infections (unpublished data). However, corticosteroids are recommended in severe infections.

**Filariasis:** At present malayan filariasis is confined to only some areas in Narathiwat Province in Southern Thailand but bancroftian filariasis is still endemic in West Thailand near the Thai-Burmese border in Ranong, Kanchanaburi and Tak Provinces. Diethylcarbamazine (DEC) is the drug of choice for lymphatic filariasis. It has been used effectively in mass treatment of malayan filariasis in the South (Harinasuta *et al.*, 1964). The dosages used in Thailand at the present time are 2 mg/kg thrice daily for 5 days for *Brugia malayi* and for 10 days for *Wuchereria bancrofti* (Chutidamrong, 1984), but a higher total dosage of DEC, and spacing individual doses to weekly or monthly intervals appear to yield better results (WHO, 1984). DEC should also be given to those with lymphoedema or early elephantiasis in spite of absence of microfilariae in the community of filariasis, because clinical improvement has been observed in timorian elephantiasis.

**Gnathostomiasis:** Metronidazole at the dosage of 400 mg thrice daily for 21 days significantly reduced the recurrence rate, the duration of swelling and the eosinophil count in the blood but did not cure the infection (Suntharasamai, 1984).

#### Trematode infections

**Opisthorchiasis:** Praziquantel at the dosage of 25 mg/kg thrice for one day gave a cure rate of 100%, but a single dose of 40 mg/kg (at bed time) which gave 95% cure rate is more appropriate for mass treatment (Bunnag and Harinasuta, 1980, 1981a). The results were confirmed by Supanvanich *et al.*, (1982) and Pungpak *et al.*, (1983, 1985). Mebendazole at the dosage of 30 mg/kg for three and

four weeks gave cure rates of 89% and 94% (Jaroonvesama *et al.*, 1981) but albendazole at the dosages of 400 mg twice daily for 3-7 days were less effective (Pungpak *et al.*, 1984; Chitchang *et al.*, 1984a), the optimal dose and the duration of treatment have not been achieved.

**Fasciolopsiasis:** Niclosamide is less effective; tetrachlorethylene at the dosage of about 0.1 ml/kg gave a cure rate of 77% (Suntharasamai *et al.*, 1974). Praziquantel gave 100% cure rate with a single dosage of 15 mg/kg (Bunnag *et al.*, 1983), but the lower dosage has not been tried.

Several other species of intestinal flukes were effectively expelled by tetrachlorethylene (Bhaibulaya *et al.*, 1964), praziquantel (Radomyos *et al.*, 1984) and albendazole (Pungpak *et al.*, 1984).

**Paragonimiasis:** Bithional is effective but the side-effects are common (Charoenlarp *et al.*, 1964). At present praziquantel is the drug of choice. The recommended dosage is 25 mg/kg thrice daily for two days (Benjapong *et al.*, 1984; Vanijanonta *et al.*, 1985a).

**Mekong schistosomiasis:** It is endemic in some areas of the Mekong River and its tributaries. Praziquantel was tried in Cambodian refugees and gave a cure rate of 100% at the dosage of 30 mg/kg twice for one day (Keittivuti *et al.*, 1984).

#### Cestode infections

**Taeniasis:** A single dose of 2 gm of niclosamide gave a cure rate of 78% (Jaroonvesama and Harinasuta, 1972), it should be followed by a purgative in taeniasis solium. Puag-Haad, a crude aqueous extract of *Artocarpus lakoocha*, has been used for the treatment of tapeworm infection for a long time by the indigenous people in Thailand. A single dose of 5 gm of Puag-Haad gave a cure rate of more than 80% (Charoenlarp

*et al.*, 1981) and its ether extract at the dosage of 50 mg/kg gave similar results (Preuksaraj *et al.*, 1981)

Praziquantel was also effective in expelling the whole worms (Radomyos *et al.*, 1984) and the optimal dose is under study.

**Hymenolepiasis:** Niclosamide is effective in *Hymenolepis nana* infection. A single dose of 80 mg/kg followed by magnesium sulphate could expel many of the worms (Chitchang *et al.*, 1985), but a course of seven days is recommended for cure.

**Cysticercosis cellulosae:** Praziquantel at the dosage of 10 mg/kg thrice daily for 10 days with prednisolone resulted in clinical improvement and decrease in size of the newly formed subcutaneous and intracranial parenchymatous cysts (Vanijanonta and Bunnag, 1985).

#### SUMMARY

A brief review of the chemotherapy of parasitic infections encountered in Thailand is presented with emphasis on dosages, cure rates and side effects.

#### REFERENCES

- BHAIBULAYA, M., CHAROENLARP, P. and HARINASUTA, C., (1964). Report of cases of *Echinostoma malayanum* and *Hypoderaeum conoideum* in Thailand. *J. Med. Ass. Thailand*, 47 : 720.
- BHAIBULAYA, M. and KOBWANTHANAKUN, S., (1984). Non fish eating intestinal capillariasis and the efficacy of albendazole. *J. Parasit. Trop. Med. Ass. Thailand*, 7 : 47.
- BHAIBULAYA, M., PUNNAVUTTI, V. and YAMPUT, S., (1975). Mass treatment of hookworm infection with single dose of pyrantel pamoate. *J. Med. Ass. Thailand*, 58 : 347.
- BENJAPONG, W., NAEYPATIMANOND, S., BENJAPONG, K., THUMARUKSA, C., RATTANASARN, S. and JAROONVESAMA, N., (1984). Studies on paragonimiasis: Treatment with mebendazole, emetine with mebendazole and praziquantel. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 15 : 354.
- BUNNAG, D. and HARINASUTA, T., (1980). Studies on the chemotherapy of human opisthorchiasis in Thailand: I. Clinical trial of praziquantel. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 11 : 528.
- BUNNAG, D. and HARINASUTA, T., (1981a). Studies on the chemotherapy of human opisthorchiasis in Thailand : III. Minimum effective dose of praziquantel. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 12 : 413.
- BUNNAG, D. and HARINASUTA, T., (1981b). Chemotherapy of intestinal parasites in Southeast Asia. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 12 : 422.
- BUNNAG, D. and HARINASUTA, T., (1984). Trematode infections excluding schistosomiasis, p. 223, *In: Recent Advances in Tropical Medicine*. H.M.Gilles (ed.) Churchill Livingstone, Edinburgh.
- BUNNAG, D., HARINASUTA, T., VASUVAT, C., VISUTHIKOSOL, Y., VIDHYANONT, C. and CHULAJATA, N., (1978). Clinical trial of mebendazole on whipworm and hookworm. *J. Med. Ass. Thailand*, 61 : 319.
- BUNNAG, D., HARINASUTA, T., VIRAVAN, C., VANIJANONTA, S. and JAVANAVEJ, A., (1975). Clinical trial of metronidazole low dosage in amoebic liver abscess. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 6 : 99.
- BUNNAG, D., HARINASUTA, T., VIRAVAN, C., JARUPAKORN, V., CHINDAMOND, D. and DESAKORN, V., (1980). Clinical trial of flubendazole on hookworm, *Trichuris trichiura* and *Ascaris lumbricoides* infec-

- tions. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 11 : 363.
- BUNNAG, D., RADOMYOS, P. and HARINASUTA, T., (1983). Field trial on the treatment of fasciolopsiasis with praziquantel. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 14 : 216.
- CHASILWATTANA, P., BHIRALEUS, P., PATANAPARNICH, P. and BHADRAKOM, C., (1980). Double blind comparative study of tinidazole and ornidazole as a single dose treatment of vaginal trichomoniasis. *J. Med. Ass. Thailand*, 63 : 448.
- CHAROENLARP, P., (1985). Shigellosis, salmonellosis, amoebic dysentery, enteric fever. *Clinic (Bangkok)* 1(5) : 13.
- CHAROENLARP, P., RADOMYOS, P. and HARINASUTA, T., (1981). Treatment of taeniasis with puag-haad: a crude extract of *Artocarpus lakoocha* wood. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 12 : 568.
- CHAROENLARP, P., VAJRASTHIRA, S., BHAI-BULAYA, M. and HARINASUTA, C., (1964). The treatment of paragonimiasis with bithionol. *J. Med. Ass. Thailand*, 47:431.
- CHITCHANG, S., LEELAYOOVA, S. and PIAMJINDA, T., (1983). Albendazole in treatment of hookworm infestation. *J. Med. Ass. Thailand*, 66 : 45.
- CHITCHANG, S., LEELAYOOVA, S., YODMANI, B., SOMBATHAWEE, C. and SAMPATTAVANJA, S., (1984a). Albendazole in the treatment of opisthorchiasis in Thailand. *Roy. Thai Army Med. J.*, 37 : 231.
- CHITCHANG, S., PIAMJINDA, T. and YODMANI, B. (1984b). Albendazole in treatment of strongyloidiasis in Thai children. *Roy. Thai Army Med. J.*, 37 : 103.
- CHITCHANG, S., PIAMJINDA, T., YODMANI, B. and RADOMYOS, P., (1985). Relationship between severity of the symptom and the number of *Hymenolepis nana* after treatment. *J. Med. Ass. Thailand*, 68 : 423.
- CHONGSUPHAJASIDDHI, T., PAIROJBOOT, N., CHUENCHUSIN, S. and HARINASUTA, T., (1971). Treatment of *Entamoeba histolytica* cyst passers with metronidazole. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 2 : 29.
- CHONGSUPHAJASIDDHI, T., SABCHAROEN, A., ATTANATH, P., PANASOPONKUL, C. and RADOMYOS, P., (1978). Treatment of soil-transmitted nematode infections in children with mebendazole. *Ann. Trop. Med. Parasit.*, 72 : 59.
- CHUTABUDDHI, A. and SIRIPOOL, P., (1986). Kala-azar. *Folk Doctor Mag. (Bangkok)* 7(81) : 34.
- CHUTIDAMROENG, C., (1984). Filariasis in Thailand (abstract). XXVIII Annual Meeting of Medical Association of Thailand, Suratthani, 24-26 October 1984 : p.25.
- HARINASUTA, C., CHAROENLARP, P., GUPTAVANI, P. and SUCHARIT, S., (1964). A pilot project for the control of filariasis in Thailand. *Ann. Trop. Med. Parasit.*, 58 : 315.
- HARINASUTA, T. and BUNNAG, D., (1985). Amoebic liver abscess. *Clinic (Bangkok)*, 1(7) : 11.
- JARIYA, P., MAKEO, S., JAROONVESAMA, N., KUNARATANAPRUK, S., LAWHANUWAT, C. and PONGCHAIKUL, P., (1983). Primary amoebic meningoencephalitis: a first reported case in Thailand. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 14 : 525.
- JAROONVESAMA, N., CHAROENLARP, K. and CROSS, J.H., (1981). Treatment of *Opisthorchiasis viverrini* with mebendazole. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 12 : 595.
- JAROONVESAMA, N. and HARINASUTA, T., (1972). Comparison of the efficacy of niclosamide and of quinacrine in the treatment of intestinal taeniasis. *Siriraj Hosp. Gaz.*, 24 : 1095.

- KEITTIVUTI, B., KEITTIVUTI, A., O'ROURKE, T. and D'AGNES, T., (1984). Treatment of *Schistosoma mekongi* with praziquantel in Cambodian refugees in holding centres in Prachinburi Province, Thailand. *Trans. Roy. Soc. Trop. Med. Hyg.*, 78 : 477.
- LIMPAPHAYOM, T., WANGSPA, S. and LILAPATANA, P., (1977). Optic atrophy from Ma-klua. *Siriraj Hosp. Gaz.*, 29 : 454.
- MIGASENA, S., SUNTHARASAMAI, P. and HARINASUTA, T., (1978). Mebendazole, tetrachlorethylene and pyrantel pamoate in the treatment of hookworm infection. *Ann. Trop. Med. Parasit.*, 72 : 199.
- MIGASENA, S., SUNTHARASAMAI, P., INKATANUWAT, S., CHINDANOND, D. and HARINASUTA, T., (1971). Clinical trial of the extract of *Diospyros mollis* berries in hookworm infected patient. Proceedings the Symposium on Chemotherapy in Tropical Medicine of Southeast and Far East, Bangkok 26-30 October 1971, p.166.
- PREUKSARAJ, S., JERADIT, C., SATHITAYATHAI, A., KIJVANNEE, S. and SEEDONRUSMI, (1982). Studies on prevalence and intensity of intestinal helminthic infection in the rural population of Thailand 1980-1981. *Com. Dis. J.* (Bangkok), 8 : 245.
- PREUKSARAJ, S., JERADIT, C., SATHITAYATHAI, A. and NILAPUN, S., (1981). Study on the efficacy of Ma-hard (*Artocarpus lakoocha*) against *Taenia* infection. *APCO*, Japan, 2 : 134.
- POLNIKORN, N. and VIRAVAN, C., (1985). Pictorial diagnosis. *Clinic* (Bangkok) 1(9) : 2.
- PUNGPAK, S., BUNNAG, D. and HARINASUTA, T., (1983). Clinical and laboratory evaluation of praziquantel in opisthorchiasis. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 14 : 363.
- PUNGPAK, S., BUNNAG, D. and HARINASUTA, T., (1984). Albendazole in the treatment of opisthorchiasis and concomitant intestinal helminthic infections. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 15 : 44.
- PUNGPAK, S., BUNNAG, D. and HARINASUTA, T., (1985). Studies on the chemotherapy of human opisthorchiasis: effective dose of praziquantel in heavy infection. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 16 : 248.
- RADOMYOS, P., BUNNAG, D. and HARINASUTA, T., (1984). Worms recovered in stools following praziquantel treatment. *Arzneim.-Forsch./Drug Res.*, 34 : 1215.
- SABCHAROEN, A., CHONGSUPHAJASIDDHI, T. and ATTANATH, P., (1980). Treatment of giardiasis in children with quinacrine, metronidazole, tinidazole and ornidazole. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 11:280.
- SADUN, E.H. and VAJRASTHIRA, S., (1954). The effect of Maklua (*Diospyros mollis*) in the treatment of human hookworm. *J. Parasit.*, 40 : 49.
- SUNTHARASAMAI, P., (1983). Gnathostomiasis, p.5.440. In: Oxford Textbook of Medicine, D.J.Weatherall, J.G.G.Ledingham and D.A.Warrell (eds.) vol. 1. Oxford University Press, New York.
- SUNTHARASAMAI, P., BUNNAG, D., TEJAVANIJ, S., HARINASUTA, T., MIGASENA, S., VUTIKES, S. and CHINDANOND, D., (1974). Comparative clinical trials of niclosamide and tetrachlorethylene in the treatment of *Fasciolopsis buski* infection. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 5 : 556.
- SUNTORNPOCH, V. and CHAVALITTAMRONG, B., (1981). Treatment of giardiasis in children with tinidazole, ornidazole and metronidazole. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 12 : 231.

- SUPANVANICH, S., SUPANVANICH, K. and PAWABUT, P., (1982). Field trial of praziquantel in human opisthorchiasis in Thailand. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 12 : 598.
- UNHANAND, M., SRINOPHAKUN, S., SEEDONONROSMI, T., JERADIT, C., NILAPAN, S. and SATHILAYATHAI, A., (1978). Study on the efficacy of an alcoholic extract of Maklua (*Diospyros mollis*) against hookworm, *Ascaris* and *Trichuris* infections. *APCO, Japan*, 1 : 289.
- VANIJANONTA, S. and BUNNAG, D., (1985). Treatment of cysticercosis with praziquantel at the Bangkok Hospital for Tropical Diseases. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 16 : 435.
- VANIJANONTA, S., BUNNAG, D. and HARINASUTA, T., (1985a). Clinical trials of praziquantel on pulmonary paragonimiasis. *J. Parasit. Trop. Med. Ass. Thailand*, 8 : 5.
- VANIJANONTA, S., BUNNAG, D., LOOAREESUWAN, S. and HARINASUTA, T., (1985b). Low dose tinidazole in the treatment of amoebic liver abscess. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 16 : 253.
- VIRAVAN, C., MIGASENA, S., BUNNAG, D. and HARINASUTA, T., (1982). Clinical trial of albendazole in hookworm infection. *Southeast Asian J. Trop. Med. Pub. Hlth.*, 13 : 054.