

# Usefulness of pumpkin seeds combined with areca nut extract in community-based treatment of human taeniasis in northwest Sichuan Province, China

We dedicate this paper to Mrs. Hikari Ito, who continuously encouraged international joint projects from the beginning but passed away on 30 May 2012.

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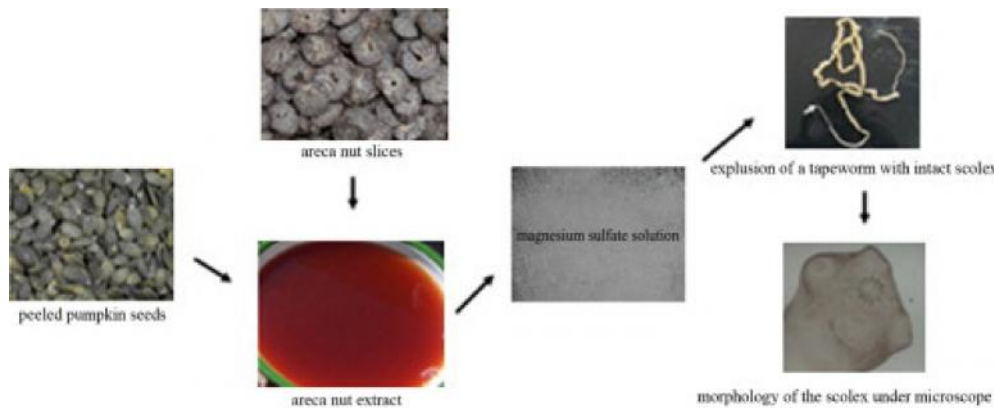
## Abstract

Taeniasis refers to the infection with adult tapeworms of *Taenia* spp. in the upper small intestine of humans, which is also a cause of cysticercosis infection in either both humans and/or animals. Currently the most commonly applied anthelmintics for treatment of taeniasis are praziquantel and niclosamide. Praziquantel is very effective, but has the risk of induction of epileptic seizures or convulsions in carriers with asymptomatic concurrent neurocysticercosis. In contrast, niclosamide is safe and effective, but is not readily available in many endemic countries including China. In the current community-based study, we assessed the curative effect of either pumpkin seeds or areca nut extract alone in taeniasis, and also looked at synergistic effects of these two herb drugs on tapeworms. In the study group with the pumpkin seed/areca nut extract treatment, 91 (79.1%) of 115 suspected taeniasis cases (with a history of expulsion of proglottids within the previous one year) released whole tapeworms, four (3.5%) expelled incomplete strobila, and no tapeworms or proglottids were recovered in the remaining 20 cases. In these 115 persons, 45 were confirmed as taeniasis before treatment by microscopy and/or coproPCR. Forty (88.9%) of 45 confirmed cases eliminated intact worms following treatment. The mean time period for complete elimination of tapeworms in 91 taeniasis cases was 2 h (range 20 min to 8 h 30 min), and 89.0% (81) of 91 patients discharged intact worms within 3 h after drug administration. In Control Group A with treatment of pumpkin seeds alone, 75.0% (9/12) of confirmed taeniasis cases expelled whole tapeworms, but the mean time period for complete elimination was about 14 h 10 min (range 3 h 20 min to 21 h 20 min), which was much longer than that (2 h) for the study group, whereas in Control Group B treated with areca nut extract alone, only 63.6% (7/11) of taeniasis cases discharged whole tapeworms, and the mean time period was 6 h 27 min (range 1–22 h). Mild side effects included nausea and dizziness in about 46.3% of patients with the pumpkin seeds/areca nut extract treatment, but all discomforts were transient and well tolerated. In conclusion, a synergistic effect of pumpkin seed and areca nut extract on *Taenia* spp. tapeworms was confirmed in the current study, primarily in producing an increased rate of effect on tapeworm expulsion (average time 2 h for combination vs 6–21 h for individual extracts). The pumpkin seed/areca combined treatment was indicated to be safe and highly effective (89%) for human taeniasis.

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Graphical abstract

. Synergistic effects of pumpkin seeds and areca nut extract on tapeworms.



## Highlights

► The curative effect of the treatment with pumpkin seeds combined areca nut extract, pumpkin seeds only or areca nut extract alone is assessed in taeniasis patients. ► The pumpkin seed/areca nut extract treatment has much better effect on eliminating of intact tapeworms, compared to either pumpkin seeds or areca nut extract alone. ► Common side-effects include mild and short-term nausea and dizziness. ► The pumpkin seed/areca nut extract treatment is a safe and effective measure for control of cysticercosis in endemic areas.

## Keywords

- Taeniasis;
- Carrier;
- Pumpkin seed;
- Areca nut;
- Treatment;
- Cure rate