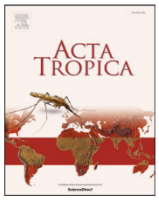
Acta Tropica 240 (2023) 106860

Contents lists available at ScienceDirect

Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica



Red palm olein-enriched biscuit supplementation lowers *Ascaris lumbricoides* reinfection at 6-month after anthelmintic treatment among schoolchildren with vitamin A deficiency (VAD)

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ARTICLE INFO

Keywords:
Red palm olein
Soil-transmitted helminth
Reinfection
Vitamin A deficiency
Randomized controlled trial

ABSTRACT

Notwithstanding the global efforts made to control intestinal parasitic infections, soil-transmitted helminth (STH) infections are still one of the most prevalent infections globally, especially in developing countries. A double-blinded, randomized controlled trial was conducted on 345 primary schoolchildren (7–12 years old) with vitamin A deficiency (VAD) in rural areas of Malaysia to investigate the effects of red palm olein (RPO)-enriched biscuits on STH reinfection rates and infection intensities. The effects of the RPO-enriched biscuits (experimental group, $n = 153$) and palm olein (PO)-enriched biscuits (control group, $n = 190$), were assessed at 3- and 6-month after the administration of complete triple-dose albendazole (one dose of 400 mg for three consecutive days). The overall STH infection rate at baseline was recorded at 65.6%. At 6-month, a significantly lower reinfection rate of *A. lumbricoides* was observed in the experimental group (35.3%) compared to the control group (60.0%) ($P < 0.05$), and a significant reduction in fecal egg count (epg) of *A. lumbricoides* was observed in the experimental group from baseline ($P < 0.001$), but no significant reduction was observed in the control group. No significant differences in the reduction of infection intensities of *T. trichiura* and hookworm were observed between experimental and control groups at 3- and 6-month ($P > 0.05$). These findings suggest the potential beneficial effects of RPO-enriched biscuit supplementation on the reinfection of *A. lumbricoides*, which could be attributed to its high carotenoids content by enhancing host immune response and mucosal epithelium integrity. However, further studies are warranted to confirm whether RPO supplementation could result in similar parasite-specific beneficial effects in other community settings, as well as to explore the underlying mechanisms.

1. Introduction

Soil-transmitted helminth (STH) infections are one of the most widespread infections worldwide, affecting more than 1.5 billion individuals, accounting for 24% of the world's population (World Health Organization., 2022). The main STH species that infect humans include whipworm (*Trichuris trichiura*), roundworm (*Ascaris lumbricoides*), hookworm (*Necator americanus* and *Ancylostoma duodenale*). School-aged children are one of the most vulnerable groups affected by STH infections, and it is estimated that over 571 million school-aged children in 102 countries were at risk of the infections and required preventive chemotherapy in 2015 (World Health Organization., 2015). STH infections often coexist with malnutrition and anemia, and may negatively impact the physical growth, cognitive function, and academic performance of the children (Djuardi et al., 2021, Pabalan et al., 2018).

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https://doi.org/10.1016/j.actatropica.2023.106860
Received 22 December 2022; Received in revised form 10 January 2023; Accepted 8 February 2023
Available online 10 February 2023
0001-706X/