

RESEARCH ARTICLE

Neglected Intestinal Parasites, Malnutrition and Associated Key Factors: A Population Based Cross-Sectional Study among Indigenous Communities in Sarawak, Malaysia

Yamuna Rajoo^{1,2}, Stephen Ambu¹, Yvonne Ai Lian Lim^{2*}, Komalaveni Rajoo³, Siew Chang Tey³, Chan Woon Lu³, Romano Ngui^{2*}

1 International Medical University, Bukit Jalil, Kuala Lumpur, Malaysia, **2** Department of Parasitology, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia, **3** Hospital Sarikei, Jalan Rentap, Sarikei, Sarawak, Malaysia

* romano@um.edu.my (RN); limailian@um.edu.my (YALL)



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Abstract

Intestinal parasitic infections (IPIs) have been recognized as one of the most significant causes of illness among disadvantaged communities. Many studies have been conducted on the prevalence of IPIs in Malaysia. However, these studies mostly focused on the indigenous groups in Peninsular Malaysia. The present study was conducted to provide the current baseline data on prevalence of IPIs, anaemia, malnutrition and associated risk factors among the indigenous communities in Sarawak, situation at northwest Borneo island of Malaysia. A cross sectional study was conducted among the longhouses communities. Stool samples were obtained and examined for the presence of IPIs using microscopy technique. Haemoglobin measurement was done using a portable haemoglobin analyzer. Malnutrition (i.e., stunting, underweight and wasting) was assessed using the WHO Anthro software. Statistical analysis was carried out using SPSS software. A total of 341 participants took part in this study. The overall prevalence of IPIs was 57.5%. Multivariate analysis indicated that the absence of toilets (OR = 1.6; 95% CI = 1.1–2.7; $p = 0.002$) and close contact with animals (OR = 1.8; 95% CI = 1.3–2.9; $p = 0.027$) as significant predictors for IPIs. The incidence of anaemia was 36.4%. The incidence of underweight, wasting and stunting were 22.2%, 5.6% and 35.4%, respectively. Multivariate analysis demonstrated that low level of parental education attainment (OR = 1.9; 95% CI = 1.2–3.0; $p = 0.006$) was identified as significant predictor for anaemia. The incidence of wasting was significantly associated with mild anaemia (OR = 1.2; 95% CI = 0.9–1.7; $p = 0.024$). Low household income was identified as significant predictor for stunting (OR = 2.1; 95% CI = 1.6–2.8; $p = 0.001$) and underweight (OR = 1.9; 95% CI = 1.4–2.5; $p = 0.037$), respectively. Essentially, the present study highlighted that intestinal parasitic infections, anaemia and malnutrition are still prevalent among rural indigenous community in Sarawak. Improvement of socioeconomic status, periodic mass deworming, iron supplementation and health

education program should be included in the control and prevention of public health strategies.

Introduction

Intestinal parasitic infections (IPIs) are among the most widespread health maladies in the developing world and on the World Health Organization (WHO) list of neglected tropical diseases (NTDs) [1]. IPIs are most prevalent among the poorest people [2–7], contributing to economic instability and social marginalization that can persist from generation to generation [1]. *Ascaris lumbricoides*, *Trichuris trichiura* and hookworms, collectively referred as soil-transmitted helminths (STHs) are the most prevalent of intestinal parasites. Approximately 24% of the world's population is infected with at least one of species with an estimation of 135,000 deaths annually [8]. *Giardia lamblia*, causing giardiasis, is the most prevalent intestinal protozoan worldwide with an estimated prevalence rate ranging between 2 to 7% and 20 to 30% in developed and developing countries, respectively [9]. Another common intestinal protozoan is *Entamoeba histolytica*, causing amoebiasis which often leads to chronic intestinal infection and dissemination to the liver causing amoebic liver abscess (ALA) [2,5]. The opportunistic protozoan such as *Cryptosporidium* spp. are commonly reported among immunocompromised individuals with significant mortality and morbidity [2,5].

The relationship between IPIs particularly STHs, anaemia and malnutrition have been well documented [10–12]. They often share similar geographical areas. IPIs impair the nutritional status of those infected in many ways. These parasites can induce intestinal bleeding and competition for nutrients which leads to malabsorption of nutrients. They can also reduce food intake and ability to use protein and to absorb fat as well as increase nutrient wastage via vomiting, diarrhea and loss of appetite [11,12]. These effects lead to protein energy malnutrition, anemia and other nutrient deficiencies [11,12]. Such nutritional effects can have a significant impact on growth and physical development especially among school children and pregnant women as a result of heavy infections [10–16].

Although Malaysia has undergone rapid growth in socioeconomic and development infrastructure, IPIs and malnutrition are still endemic particularly among the underprivileged indigenous communities which are closely associated with their poor socioeconomic status (SES), personal and environmental hygiene [2,4,7,17–21]. Malaysia consists of Peninsular Malaysia and Borneo Malaysia. Most recent studies conducted among the indigenous communities in Peninsular Malaysia between 2013 and 2015 have reported overall prevalence of more than 50% [2,7,17,21]. To date, there are relatively limited data on the prevalence of IPIs among the indigenous groups in East Malaysia or Borneo Malaysia [22,23]. Moreover, almost all of these studies failed to take into consideration the possible associated risk factors among these indigenous communities. Within this context, the aim of the current study was to determine the current baseline prevalence and possible associated risk factors of IPIs, anaemia and malnutrition among the indigenous community in Sarawak. Findings of this study will fill vital gaps and provide beneficial insight and information on the epidemiology and disease dynamics of parasitic infections and its associated factors. Such data will be valuable for the public health authorities to justify and facilitate the reassessment of the existing control measures to reduce the prevalence and intensity of parasitic infections in these communities.