

Intestinal Giardiasis at UPFR Parasitology-Mycolology of CHU-JRA Antananarivo, Madagascar

Fenosoa Anita Mireille TSATOROMILA¹, Norosoa Julie ZAFINDRAIBE², Elodie Emile BATAVISOANIATSY³, Isabelle Francine Rakotonindrina⁴, Christian Rafalimanana², Aimée Olivat RAKOTO ALSON³, Lala Rasoamialy-Soa RAZANAKOLONA⁴

¹ Regional Centre for Blood Transfusion Analamanga – Antananarivo –Madagascar

² Departments of Parasitology and Mycology – University Hospital Center Joseph Ravoahangy Andrianavalona, Faculty of Medicine, Antananarivo, Madagascar

³ Department of biology, University Hospital Center Anosiala, Faculty of Medicine of Antananarivo, Madagascar

⁴ University Hospital Center Zafisaona Gabriel, Laboratory of Medical Biology, Mahajanga, Madagascar

⁵ National Reference Laboratory (LNR) HIV/AIDS and sexual transmitted infection, Antananarivo, Madagascar



Abstract

Introduction: Giardiasis is an intestinal parasitosis extremely widespread in the world but under-diagnosed in Madagascar. It is often asymptomatic. It can be fatal due to intestinal malabsorption syndrome. This study was conducted to determine the epidemiological-clinical aspect of giardiasis in Antananarivo and to determine the relevance of prescribing the KAOP stool examination for its diagnosis.

Materials and methods: We report the results of a retrospective study of 2154 KAOP stool examinations performed at the Parasitology-Mycolology Laboratory of the CHU-JRA over a 13-year period from June 2005 to June 2018.

Results. The positivity rate for intestinal parasitosis was 58.36% or 1257 out of 2154 files examined. We found a prevalence of 1.76% (38/2154) of all claims and a frequency of 3.2% (38/1257) compared to other parasitoses. We found a female predominance with a sex ratio of 0.8. The average age was 20.46 years, of which 39.47% (15/38) were under 10 years of age. Abdominal pain were the main reasons for requesting tests. Only the cystic form of *Giardia duodenalis* was found, of which 28.95% (11 cases) were isolated and 71.05% (27) were associated with one or more parasites.

Conclusion: Giardiasis is a parasitosis with a harmful effect on children. It is still under-diagnosed in Madagascar. Compliance with the prescription of 3 successive stool examinations allows a diagnosis of certainty.

Keywords - KAOP Stool Examination - Frequency - Giardia – Epidemiology.

I. INTRODUCTION

Giardiasis is an intestinal parasitosis caused by a flagellated protozoan of the digestive tract called *Giardia intestinalis*. It is the most frequent intestinal protozoonosis in the world with an estimated frequency of 280 million cases per year [1] and 2.5 million cases of diarrhoea in poor countries each year. However, this disease is one of the neglected diseases according to the world health

organization (WHO). It is associated with the degree of poverty in the country [2].

Giardiasis is one of the infectious agents responsible for infectious gastroenteritis [3] and negatively affects the growth and development of children in African countries, including Madagascar. Infectious diarrhoea is a major cause of infant mortality among children under 5 years of age in Africa [4]. Giardiasis is responsible for 2.8 x 10⁸ cases of

diarrhoea per year worldwide with a high prevalence in Africa [5]. Most infections are limited to one individual, but recurrent cases are common in endemic areas. Chronic infections are responsible for weight loss and malabsorption. This is associated with delayed growth and psychological development in developing countries [6]. It is transmitted by the faecal-oral route, often by ingestion of food and water contaminated by cysts in faeces. In Madagascar, this parasitosis is still under-diagnosed, data on its prevalence are scarce. The fight against related diseases remains between a challenge in Madagascar and hygiene remains precarious in several regions.

The objectives of our work are to determine the epidemiological-clinical aspect of giardiasis in Antananarivo and to determine the relevance of prescribing the KAOP stool examination for its diagnosis.

II. MATERIALS AND METHODS

A retrospective and descriptive study was conducted at the UPFR of Parasitology-Mycology of the CHU/JRA. It covered all the results of the KAOP (Parasitic Egg Amoeba Cyst) stool examinations between June 2005 and December 2018, a period of 13 years. The information was collected from the examination request forms, registers and bench books of the Parasitology Laboratory of the CHU-JRA. The Parasitology Laboratory of the CHU-JRA receives requests for examinations from hospitalization services and outpatient consultations from external prescribers. Included in our request forms were the request forms mentioning giardiasis as a result. The variables analysed were the final results of the KAOP stool examination, the number and type of intestinal parasites identified. Age and gender as well as the reasons for the examination were collected from the examination request forms. The parasitological examination of the stool followed the steps recommended in the department's standard operating protocols, combining a macroscopic examination of the stool and a microscopic examination. Macroscopy is the process of recording the appearance and colour of freshly emitted stools as soon as possible after their arrival in the laboratory. Microscopy, on the other hand, combines optical microscopy in the fresh state between slide and slide and Lugol stain 2% or Formol Iodine. A case of giardiasis can be summarized as a result mentioning the presence of cysts and/or vegetative form of *Giardia lamblia*. Enzyme immunoassays and molecular biology techniques are not yet available in the unit. The data were recorded on Excel 2007 software and the descriptive analysis was done on Epi Info version 7. The anonymity of the patients was respected.

This study was limited by its retrospective nature, so several variables could not be used. In addition, the population studied is not representative of the entire population of Antananarivo. For most patients, only one stool sample was received in the laboratory. In some cases, clinical information was not specified.

III. RESULTS

It is a 13-year retrospective study in patients referred to the parasitology and mycology laboratory for KAOP stool examination. We retained 2154 files during the study period, of which 1257 were positive for one or more parasites, representing a positive rate of 58.36%. We counted 38 files mentioning giardiasis as a result, representing a prevalence of 1.76% (38/2154) of all requests and a frequency of 3.2% (38/1257) compared to other parasitoses. Children under 10 years of age were the most affected by the parasite (39.47%) (Figure 1). The average age was 20.46 years with an extreme from 1 to 98 years. Female predominance (55.26%, $n=21$) was found in *Giardia duodenalis*-infected patients with a sex ratio of 0.8 all ages combined (Figure 1). Abdominal pain (21.05%, $n=8$) were the main reasons for requesting tests (Figure 2). Especially for children, the main reasons for requesting tests were for children, at 23.52% ($n=4$) (Figure 3). The cystic form of *Giardia duodenalis* was found in all infested patients. We had 11 cases of isolated giardiasis, 28.95% versus 71.05% associated with one or more parasites. Isolated giardiasis is the most case in the adult (Figure 4).

IV. DISCUSSION

Studies on giardiasis have mostly been conducted in children aged 0 to 16 years, in primary classes with or without gastrointestinal signs. Our study focuses on all cases of giardiasis diagnosed at the parasitology laboratory in the capital of Madagascar. Our prevalence of 1.76% was higher than that found (4.7%) in Mahajanga in 2002[7]. In 2012, a prevalence of 12.6% was found among 1200 diarrhoeal children under 5 years of age in 14 districts of Madagascar [8]. In our study 39.47 % of cases were observed in children under 10 years of age. The prevalence of giardiasis is not homogeneous in the different regions of our country due to differences in climate, drinking water supply and food, personal and community hygiene and socio-economic levels. It is more common in the western region of Madagascar (Maevatanana with 26.2% and Morondava with 20.2%) in 2012 [8]. This prevalence of giardiasis has ranged from 1 to 55% in different African countries [9-16] (Table I). The prevalence of giardiasis has been linked to the socio-economic level of the population, the diagnostic technique

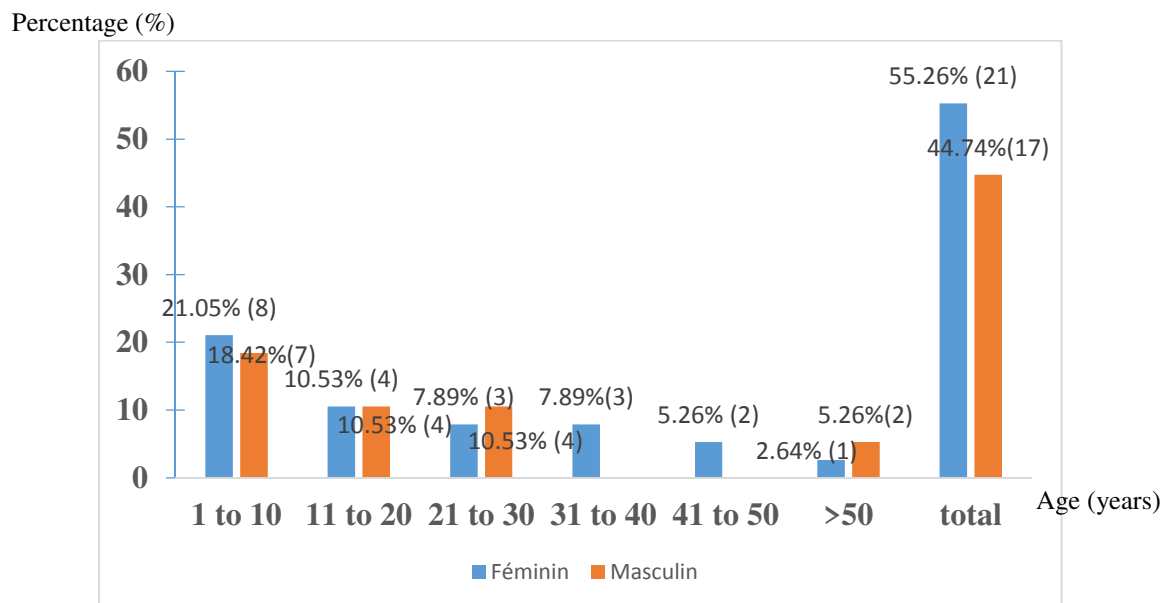


Figure 1. Distribution of *Giardia lamblia*-infected patients by age group and gender clinical information

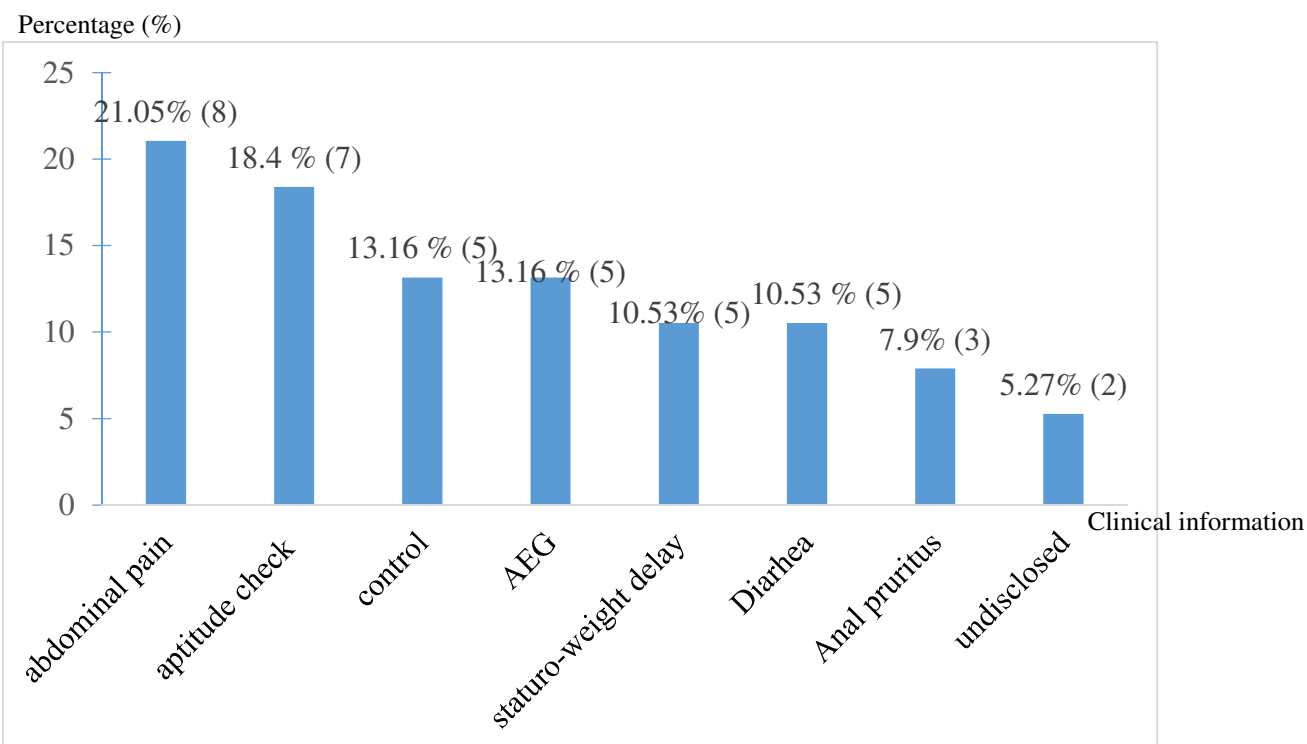


Figure 2. Distribution of *Giardia* spp positive KAOP stool examinations according to clinical information

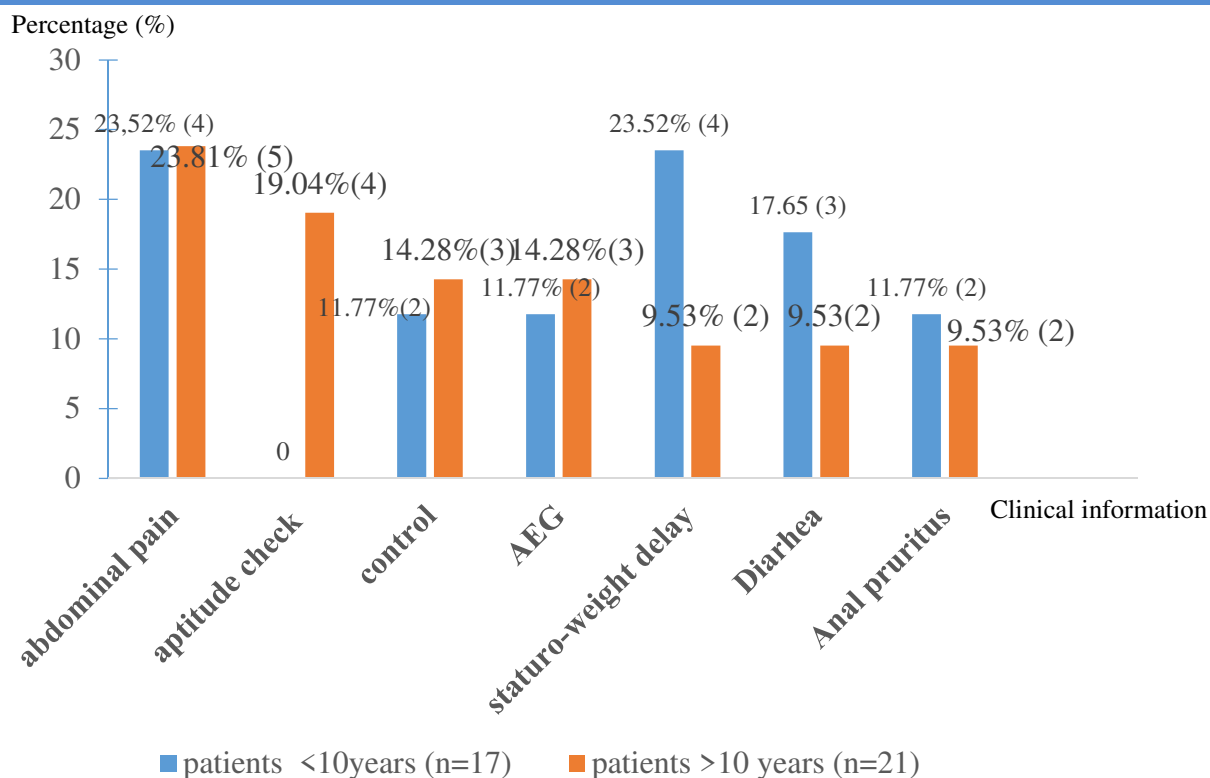


Figure 3. Main reasons for requesting KAOP stool examinations in children under 10 years of age and the *Giardia lamblia*-infested

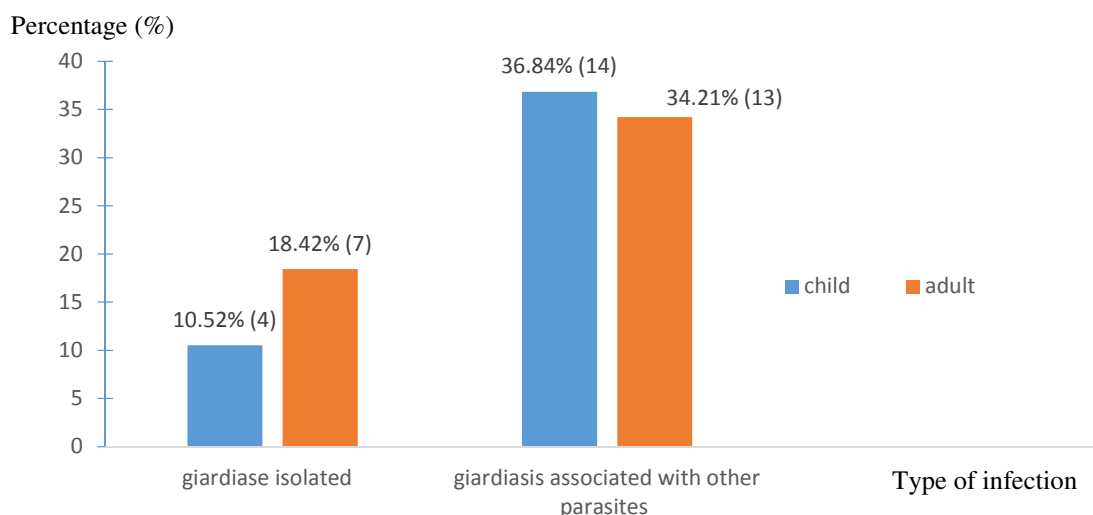


Figure 4. Distribution of patients by type of giardiasis infection

used, the patient's immune status and lifestyle. In developed countries, the risks of *Giardia* infestation are mainly associated with travel to countries in developing countries [17]. However, an English study in 2013 reported that nearly 75% of cases in the northwestern part of the country

are acquired locally. The low prevalence rate of our study could be related in part to the prescription of a single KAOP stool examination in daily medical practice, if it is recommended to request three successive KAOP stool examinations to diagnose intestinal parasitosis. For

giardiasis, a single stool examination does not adequately reflect the extent of the parasite infestation, a single stool sample only detects the parasite in 50 to 70% of cases [18]. A study in the same laboratory showed a rate of 0.51% for the prescription of KAOP stools 3 times in succession [19].

A study in Tunisia showed that examining a single stool sample underestimates the diagnosis of giardiasis by 35% [20]. The frequency of 1.76% in our study could be reduced by 35% if we refer to this study and its correction factor. If three stools are examined, the frequency of parasite identification increases to 95% [20]. The use of more efficient techniques such as the immunological and biomolecular technique associated with microscopy would increase the number of patients diagnosed for *Giardia* spp. The prescription of analyses and compliance with pre-analytical conditions require close communication and collaboration between clinician and biologist to improve patient care.

In our study, giardiasis was more frequent in children, i.e. 39.47% for children under 10 years of age (Figure 1). Our study is consistent with the literature data on the frequency of giardiasis in children [9-16]. Giardiasis is found in school-age children in kindergartens [10, 14, 16]. We therefore suggest screening children in kindergartens and daycare centres for possible healthy carriers at the beginning of the school year by systematically examining the KAOP saddle since the way of life of our community in this modern world is to leave children in daycare centres. This makes it possible to detect asymptomatic cases of giardiasis to avoid its spread and to initiate appropriate treatment, thus avoiding an epidemic outbreak for small children and serious disorders related to this parasitosis. In Malagasy medical practice, the prescription of KAOP stool examination is rare for small children. In the case of acute childhood gastroenteritis, practitioners often think that it is viral or bacterial in origin or a parenteral but not parasitic cause. The prescription for KAOP stool examination should be included in the search for etiologies of childhood diarrhea and developmental delay in children.

The clinic is variable depending on the virulence of the strain [21]. A large majority of individuals infested by *Giardia duodenalis* remain asymptomatic in 35 to 70% of cases. Giardiasis can be asymptomatic in 5-15% of infected people [22]. A minority develop acute diarrhoea with fever, non-specific signs such as abdominal bloating, abdominal pain, intermittent diarrhoea, malabsorption. The diversity of these symptoms is explained by several factors such as the size of the inoculum, the specific response of the host,

parasite-specific factors including genotypic differences. There are 5 species of *G. duodenalis* A, B, C, C, E and F in humans. A and B are the most found. Giardiasis is more significant in young children. It may be associated with stunting in developing countries [23] and it may affect the intelligence and concentration ability of children who have had a history of diarrhoea associated with giardiasis before the age of 2 years [24]. In our study, abdominal pain and weight-loss were the main reasons for requesting tests, especially for children, (Figure 3). In the adult the main reasons for requesting tests were abdominal pain and aptitude check (figure 3).

KAOP stool exams are exams widely prescribed by clinicians without taking into account the context in which they are prescribed. It can be prescribed in a context suggestive of a digestive pathology or systematically as part of health or preoperative check-ups or in fitness visits (Figures 2 and 3). Morphological identification of *Giardia* cysts in faeces by microscopy, either directly or after staining (fatty acids, lugol, iodine and immunofluorescence...), is the most common method used in Africa due to their lower costs [9-16]. The diagnosis of giardiasis is based on microbiological examination of the stool either by using traditional microscopy (KAOP) visualizing cysts or by detecting antigens in the stool [25]. Only traditional microscopy was used in our laboratory. In our parasitism study, giardiasis is rarely isolated, i.e. 28.95%. It is often associated with other intestinal parasitoses in 71.05% of cases associated with one or more parasites (Figure 4). The presence of *giardia* spp with these other protozooses, particularly amoeba-like, is a sign of consumption of food contaminated by faeces directly linked to poor hygiene. It also reflects the importance of fecal peril. The systematic deworming periodically adopted by health policy in our country is antihelminthic and does not succeed in killing protozoa. This does not reduce the parasitic load for giardiasis and children are exposed to malnutrition due to malabsorption caused by this parasitosis in addition to poverty and socio-economic problems in Madagascar. We suggest for a more in-depth study to do a prospective study with prescription of 3 successive stool samples spaced 3 to 5 days apart in front of any sick child to increase the sensitivity of the examination. At the laboratory level, it is necessary to systematically carry out enrichment and concentration techniques and various specific colorings to identify the parasitoses most often associated with Madagascar. It is even necessary to check every 3 months to detect a possible reinfestation. For traditional microscopy. Some authors require a minimum of 6 negative samples is

required for microscopic exclusion of Giardiasis infection either a KAOP stool examination 3 times spaced 2 to 3 days apart and in case of negativity requires 3 additional examinations with an interval during the week [26]. It is important to improve the clinician-biologist dialogue to ensure that the correct KAOP examination procedure is followed and that 3 routines KAOP examinations are prescribed. The requirement for the KAOP stool examination should not only be limited to children but also to the child's family and friends, especially those who are involved in the child's feeding. It is also a parasitic disease of communities, people handling food should be detected to prevent the spread of the parasitic infestation. Longitudinal and wide-ranging studies should be carried out for this pathology, which is often unknown to practitioners.

V. CONCLUSION

The prevalence of giardiasis is often underestimated in Madagascar due to the lack of sensitivity of traditional microscopic techniques and the prescription of a single KAOP stool examination. It is a common pathology in children. It can affect adults even in the absence of travel to an endemic area. Hygiene is the only way to prevent it. Screening for healthy carriers is necessary. The prescription of the KAOP stool examination and the respect of its pre-analytical conditions allow a better therapeutic and diagnostic management of patients.

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