

Prevalence of geohelminths in savana and forest areas of Côte d'Ivoire

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Summary

Background: Côte d'Ivoire has large regional variation in intestinal helminth prevalence.

Study design: In a large cross-sectional study conducted from 1997 to 1999, stool samples from 6952 children aged 4 - 15 years were examined for helminth eggs by the Kato/Katz technique from 24 villages in the savanna (North) and from 21 villages in the forest (West) in Côte d'Ivoire.

Results and conclusion: *Ascariasis lumbricoides* (0.7%) was the only species present in the savanna area. In the forest area, ascariasis occurred most frequently (18.9%), followed by trichuriasis (2%), Strongyloidiasis (0.1%) and oxyuriasis (0.03%). Ascariasis prevalence was not significantly associated with age within each ecological zone, but was significantly higher in boys in the forest zone. This study confirms that in the more arid savanna, the conditions are less suitable for helminth transmission than in the forest zone.

Key-words: Geohelminths, Ascariasis, Savanna, Forest, Côte d'Ivoire.

Résumé

Introduction: Dans la Côte d'Ivoire, il y a une grande variation régionale dans la fréquence d'helminthiase intestinale.

Plan d'étude: Dans une grande étude d'un groupe représentatif effectuée de 1997 au 1999, prélèvement échantillons des fèces chez 6952 enfants âgés de 4 - 15 ans ont été étudiés pour des oeufs d'helminthiase à travers la méthode kato/katz dans 24 villages au nord de savane et dans 21 villages dans la forêt ouest de la Côte d'Ivoire.

Résultats et conclusion: *Ascaris lumbricoides* (0,7%) était la seule espèce présente dans la province de la savane. Dans la région de la forêt, l'ascaris arrive le plus souvent (18,9%), suivi par Trichurose (2%), strongyloïdose (0,1%) et oxyurose (0,03%). La fréquence d'ascaris n'était pas importante liée

avec l'âge entre chaque zone écologique, mais était *sinsiblement* élevé chez des garçons dans la région de la forêt. Cette étude confirme le fait que dans la savane la plus aride, les conditions sont moins confortable pour la transmission de l'helminthiase plus que dans la région de la forêt.

Background

It has been estimated that more than one billion of the world's population is chronically affected by soil-transmitted helminth infections¹, which are lightly correlated with poverty, poor environmental hygiene and impoverished health services. Intestinal helminthiases are among the most common communicable diseases of school-age children in certain communities and tend to occur at highest intensity in this age group.²⁻⁵ There is strong evidence to support the relationship between helminth infections, malnutrition and child development, with negative consequences for cognitive function and learning ability.⁶⁻⁸ Epidemiological surveys carried out in Côte d'Ivoire^{7,9} showed large regional variation in intestinal helminth prevalence.

Study design

In a large cross-sectional study conducted from 1997 to 1999 in savanna (North) and forest (West) areas in Côte d'Ivoire on schistosomiasis,¹⁰ the potential importance of soil-transmitted helminth infections was assessed. Stools samples were examined for helminth eggs by the Kato/Katz technique to determine the prevalence of infection. Six thousand nine hundred fifty two children aged 4 - 15 years (mean age = 9 years) were examined, of whom 3615 came from 24 villages in the savanna and 3337 came from 21 villages in the forest.

Results

Ascariasis lumbricoides (0.7%) was the only species present in the savanna area. In the forest area, A.

Table 1 Logistic regression model with village random effects to account association of *Ascaris lumbricoides* infections with age and sex in each ecological zone

	Savanna			Forest		
	Odds ratio	95%CI	P-value	Odds ratio	95%CI	P-value
Age			0.72ns			0.33ns
4 - 7 years	1			1		
8 - 11 years	0.89	0.37 - 2.10		1.01	0.81 - 1.26	
12 - 15 years	0.63	0.20 - 2.02		0.93	0.72 - 1.20	
Sex						
Male	1					
Female	1.01	0.47 - 2.21	0.98ns	0.82	0.67 - 0.99	0.02

*Legend. CI: Confidence Interval; ns: not significant at alpha = 5%; P-value is based on the likelihood ratio test

lumbricoides was associated with *Trichuris trichuria*, *Strongyloides stercoralis* and *Enterobius vermicularis*. Ascariasis occurred most frequently (18.9%), followed by trichuriasis (2%), strongyloidiasis (0.1%) and oxyuriasis (0.03%). Logistic regression analysis with random effects to account for the between-village variation showed that Ascariasis prevalence was not significantly associated with age within each ecological zone, and significant with sex in the forest zone (Table 1). *Ascaris lumbricoides* prevalence was significantly higher in the forest area than in the savanna area (OR = 0.03; 95%CI = 0.02 - 0.06).

Discussion

Low prevalences of Ascariasis have been reported in Ethiopia (2.3%) by Alemayehu et al.,¹¹ in Madagascar (3.6%) by Hoffman et al.¹² and in Chad (3.8%) and Mali (0.1%) by Crompton and Tulley.¹³ High prevalences of *A. lumbricoides* have been reported in Democratic Republic of Congo (57.3%) and Kenya (38.3%) by Crompton¹⁴ and in Côte d'Ivoire (38.3%) by Utzinger et al.⁹ Our results in the forest zone were comparable to those reported in Morocco (20.5%) by Habbari et al.,¹⁵ in Côte d'Ivoire (33%) by Nozais⁷ and in Nigeria (22.9%) by Nwaorgu et al.¹⁶ Ascariasis prevalence depends largely on personal hygiene and behaviour (interaction with the environment), but also on the parasite itself (e.g. immaturity, male predominance, low infestation or low fertility).

Current studies do not allow linking the role of reservoir hosts to human transmission. Pigs host the parasite and can be considered as a sure source of contamination to humans.¹⁴ Environmental factors including the structure and the composition of the soil and climatic factors should be expected to influence the distribution and prevalence of *A. lumbricoides* and other worms (trichuriasis, strongyloidiasis and oxyuriasis) because of their role in embryonation and in the survival of infective eggs. In Africa, *Ascaris* prevalence is generally low in arid climate zones (savanna) and high in those with consistent wet weather and warmth (forest).¹⁷⁻¹⁹ Our observations confirmed those by Ratard et al.¹⁷ in Cameroon.

Acknowledgements

The data collection was conducted within the framework of the WARDA/WHO-FAO-UNEP PEEM/IDRC/DANIDA/Norway Health Research Consortium on the Association between Irrigated Rice Production Systems and Vector-borne Diseases in West Africa. We thank Prof. M. Tanner, Director of Swiss Tropical Institute for useful suggestions.

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