

PREVALENCE OF *STRONGYLOIDES STERCORALIS* IN FOREIGN-BORN CHILDREN

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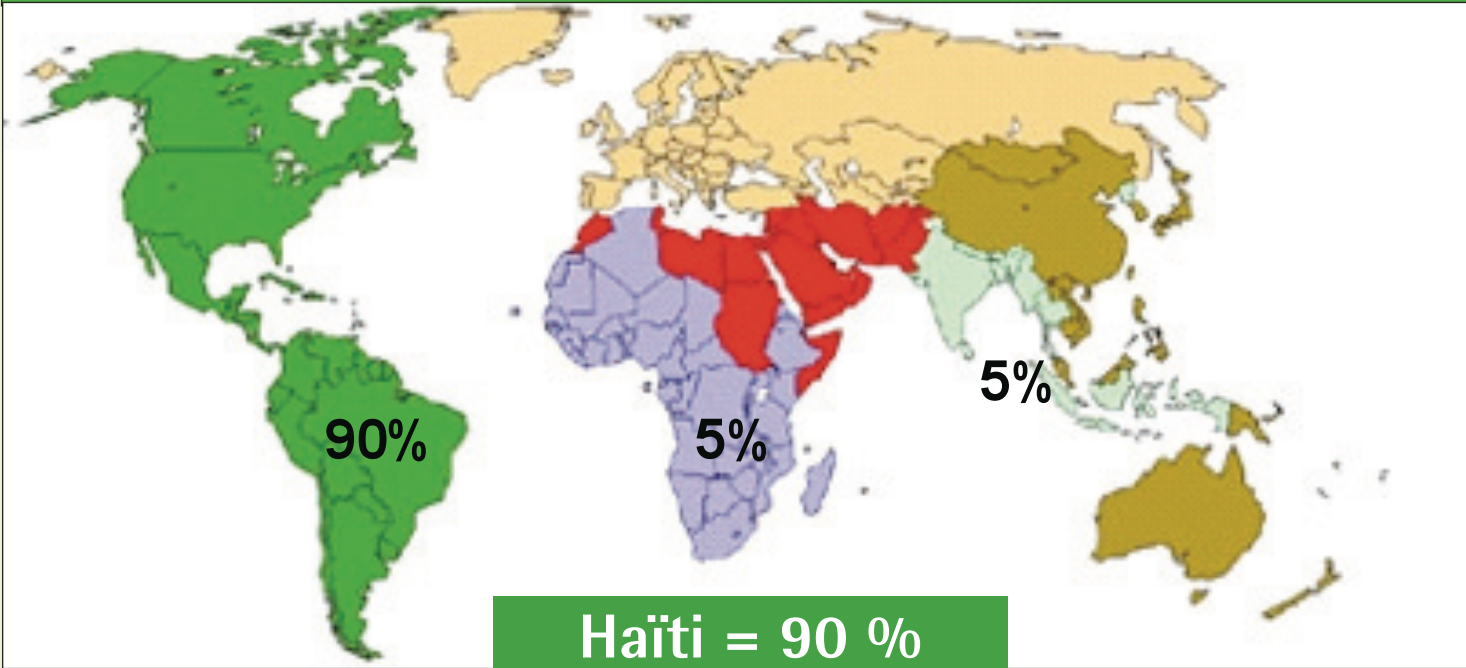
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Background and Objective

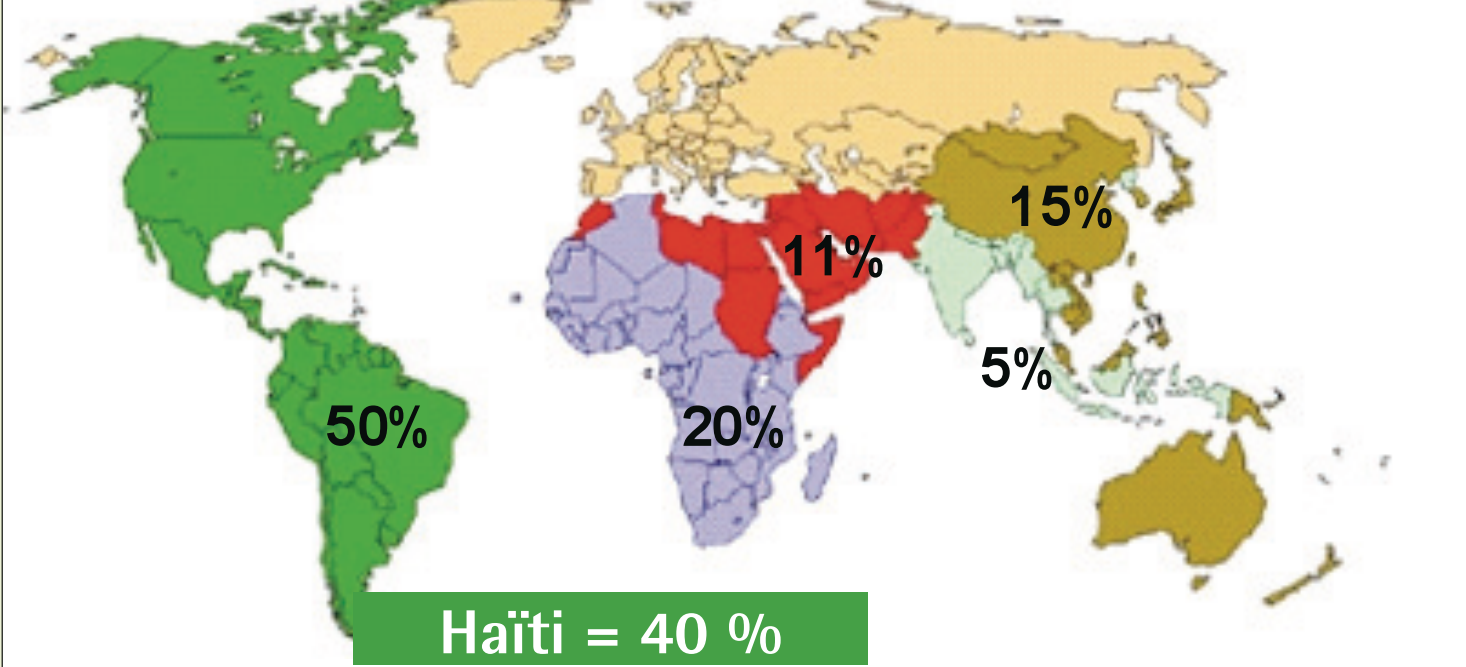
Foreign-born children often harbour intestinal parasites. We evaluated the prevalence of *Strongyloides stercoralis* (SS) infection in children immigrating to Canada.

Region of Origin

Patients with Positive Test for SS
N = 18



Patients with Negative Test for SS
N = 218



According to WHO Region²

Methods

- Prospective cohort study
- Immigrant Health Clinic and Tuberculosis Clinic of CHU Sainte-Justine, a paediatric tertiary care center in Montreal, Canada
- From 2009/11 to 2010/06
- Demographic information, growth parameters and laboratory screening tests including SS serology (enzyme immunoassay) and 3 stool specimens for ova and parasites exam were gathered.
- National Center for Health Statistics standardized growth charts^{1,2} were used.
- Region of origin was categorized according to the World Health Organization groupings.³
- Data compilation and analysis were realized with Microsoft Excel Office XP and SPSS software.



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- *Ancylostoma duodenale*, *Ascaris lumbricoides*, *Dientamoeba fragilis*, *Entamoeba histolytica*, *Enterobius vermicularis*, *Giardia lamblia*, *Hymenolepis nana*, *Schistosoma mansoni*, *Strongyloides stercoralis* and *Trichuris trichiura* were considered to be pathogenic, while *Blastocystis hominis*, *Chilomastix mesnili*, *Endolimax nana*, *Entamoeba coli*, *Entamoeba dispar*, *Entamoeba hartmanii* and *Iodamoeba buetschlii* were considered to be non-pathogenic.

Table 1 Demographic Information and Growth Parameters

	Positive Test for SS N=18	Negative Test for SS N=218
Gender (female); N (%)	13 (72.2)	113 (51.8)
Age (years)		
Average ± SD	4.8 ± 2.9	7.0 ± 4.8
Median and Ranges	4.4 [2.8-15.8]	5.7 [0.2-18.7]
Age ≤ 5 years		
N (%)	14 (77.8)	96 (44.0)
Average ± SD	3.9 ± 0.7	2.6 ± 1.3
Median and Ranges	3.7 [2.8-5.0]	2.6 [0.2-5.0]
Delay between arrival and evaluation (months)		
Average ± SD	16.0 ± 12.4	13.1 ± 14.4
Median and Ranges	13.8 [8.9-64.4]	7.2 [0-58.4]
Origin		
Americas; N	16	108
Haïti; N (%)	16 (88.9)	88 (40.4)
Africa; N (%)	1 (5.6)	44 (20.2)
East Asia/Western Pacific; N (%)	0	33 (15.1)
Mediterranean/Middle East; N (%)	0	23 (10.6)
Southeast Asia; N (%)	1 (5.6)	10 (4.6)
Immigration Status		
Permanent residents; N (%)	5 (27.8)	132 (60.6)
Temporary residents; N (%)	13 (72.2)	63 (28.9)
Refugees or Asylum seekers; N (%)	0	23 (10.6)
Weight <5% Percentile; N (%)	5 (27.8)	30/217 (13.8)
Height <5% Percentile; N (%)	8/15 (53.3)	25/217 (11.5)
Head Circumference <5% Percentile; N (%)	3/5 (60.0)	11/44 (25.0)

Table 3 Description of positive cases of *Strongyloides stercoralis*

Cases	Gender	Age (years)	Country	Growth	Eosinophil Count ≥500 cell/mm ³	Stool parasites	SS serology*	Treatment
1	F	5	Haïti	N	200	<i>Giardia</i>	0.30	Metronidazole, Ivermectin
2	M	5	Haïti	Weight< 5% Height < 5%	1900	<i>Giardia</i>	0.42	Metronidazole, Ivermectin
3	M	5	Haïti	N	2900	<i>Giardia</i> , <i>Blastocystis hominis</i>	0.33	Metronidazole, Ivermectin
4	F	6	Ghana	N	400	NS	0.56	Ivermectin
5	F	5	Haïti	Height < 5%	1900	negative	1.21	Metronidazole, Ivermectin
6	M	4	Haïti	Height < 5%	3800	<i>Hymenolepis nana</i>	0.93	Metronidazole, Ivermectin, Praziquantel
7	M	3	Haïti	Weight< 5% Height < 5%	1400	negative	1.39	Ivermectin
8	F	3	Haïti	N	1800	Multiple ¹ with SS	2.88	Ivermectin
9	F	4	Haïti	Weight< 5%	1500	NS	1.97	Metronidazole, Ivermectin
10	M	3	Haïti	HC <5%	1200	Multiple ² with SS	1.59	Ivermectin, Praziquantel
11	F	5	Haïti	HC <5%	1600	Multiple ³	0.81	Metronidazole, Ivermectin, Praziquantel
12	F	3	Haïti	N	2500	Multiple ⁴ with SS	1.05	Ivermectin
13	F	4	Haïti	Height < 5%	600	Multiple ⁵	0.88	Ivermectin, Praziquantel
14	F	5	Haïti	Weight< 5% Height < 5%	600	Multiple ⁶ with SS	0.08	Metronidazole, Ivermectin, Mebendazole
15	F	4	Haïti	Height < 5%	500	Multiple ⁷	0.29	Ivermectin, Praziquantel
16	F	3	Haïti	Weight< 5% Height < 5% HC <5%	2400	NS	0.24	Metronidazole, Ivermectin
17	F	16	Haïti	N	0	<i>Endolimax nana</i>	0.27	
18	F	5	Bangladesh	N	200	Multiple ⁸	0.22	Mebendazole, Albendazole, Paromomycine

* Strongyloides serology: M: male, NS: no samples, HC: head circumference, Positive [≥0.20], F: female
Multiple Parasites:
1. Blastocystis hominis, Chilomastix mesnili, Entamoeba hartmanii, Entamoeba histolytica/dispar, Dientamoeba fragilis, Giardia, Hymenolepis nana
2. Blastocystis hominis, Endolimax nana, Entamoeba dispar, Hymenolepis nana, Strongyloides stercoralis
3. Blastocystis hominis, Chilomastix mesnili, Entamoeba hartmanii, Entamoeba histolytica/dispar, Dientamoeba fragilis, Giardia, Hymenolepis nana
4. Blastocystis hominis, Entamoeba coli, Endolimax nana, Strongyloides stercoralis
5. Blastocystis hominis, Endolimax nana, Entamoeba coli, Hymenolepis nana
6. Blastocystis hominis, Chilomastix mesnili, Endolimax nana, Entamoeba histolytica/dispar, Ancylostoma, Giardia, Strongyloides stercoralis
7. Blastocystis hominis, Chilomastix mesnili, Entamoeba histolytica/dispar, Dientamoeba fragilis, Giardia, Hymenolepis nana
8. Blastocystis hominis, Ascaris, Dientamoeba fragilis

Table 2 Laboratory screening

	Positive Test for SS N=18	Negative Test for SS N=218
Iron saturation		
≤0.20; N (%)	12/16 (75.0)	113/154 (73.4)
Average ± SD	0.11 ± 0.05	0.13 ± 0.05
Median and Ranges	0.11 [0.01-0.18]	0.14 [0.02-0.20]
Eosinophilia		
≥500 cells/mm ³ ; N (%)	14 (77.8)	24/216 (11.1)
Average ± SD	1853.9 ± 893.1	1043.8 ± 792.4
Median and Ranges	1800 [600-3800]	700 [600-3600]
TST (PPD)		
≥10mm; N (%)	3/12 (25.0)	78/180 (43.3)
Average ± SD	15.0 ± 3.5	17.4 ± 6.6
Median and Ranges	13.0 [13-19]	15.0 [10-40]
Hepatitis B		
HBsAg; N (%)	0	2/216 (0.9)
Anti-HBs ≥ 10 mU/ml; N (%)	4 (22.2)	96/213 (45.1)
Anti-HBc (Ig G) ; N (%)	1/17 (5.9)	3/199 (1.5)
Anti-HBc (Ig M) ; N (%)	0	1/3
Hepatitis C (Anti-HCV Ig G); N (%)	0/16	0/215
Syphilis (RPR); N (%)	0	0
HIV (Elisa); N (%)	0/17	0/213
Stool parasites		
Infection with ≥1 pathogen/commensal; N (%)	13/15 (86.7)	84/180 (46.6)
Infection with ≥3 pathogens/commensals; N (%)	8/15 (53.3)	34/180 (18.8)
Infection with ≥1 pathogen; N (%)	12/15 (80.0)	47/180 (26.1)
Bacterial stool cultures; N (%)	2/10 (20.0)	4/59 (6.8)

Table 4 Univariate and multivariate analysis for positive test for SS

N total = 236	Crude OR (95% CI)	Adjusted * OR (95% CI)
Female	2.4 [0.8 - 7.0]	-
Age ≤ 5 years	4.4 [1.4 - 13.9]	-
Haïti	11.8 [2.7 - 52.7]	3.6 [0.7 - 19.1]
Weight < 5% Percentile	2.4 [0.8 - 7.2]	-
Iron Saturation ≤ 0.20	1.1 [0.3 - 3.6]	-
Eosinophilia ≥ 500/mm³	28.0 [8.5 - 92.0]	13.6 [3.8 - 49.4]
TST (PPD) ≥10mm	0.9 [0.7 - 1.2]	-
Stool parasites		
Infection with ≥1 pathogen/commensal	4.1 [1.4 - 12.0]	-
Infection with ≥3 pathogens/commensals	4.3 [1.6 - 11.7]	-
Infection with ≥1 pathogen	7.2 [2.6 - 20.3]	2.6 [0.8 - 8.7]
Bacterial stool cultures	6.7 [1.1 - 39.3]	-

* Adjusted in the model for country of origin, eosinophilia and infection with pathogenic parasite

Conclusion

- We found a significant prevalence (7.7 %) of *Strongyloides stercoralis* infection in immigrant children.
- In our univariate model, emigration from Haïti, eosinophilia, or children harbouring intestinal parasites were identified as risk factors for positive *Strongyloides stercoralis* infection.
- Eosinophilia upon arrival was identified, in our adjusted model, as the most important risk factor for positive *Strongyloides stercoralis* infection.

References

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