

Natural History of Intestinal Parasites in Asymptomatic Adults

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The need to treat asymptomatic adults who have intestinal parasites should be based on considerations of potential pathogenicity and transmission risk, but such data are sparse in general and unavailable for countries such as the United States, where reinfection is rare. Opinions of North American physicians about the natural history and treatment of 12 parasites detectable by stool examination were assessed using the Delphi technique. In response to the first questionnaire, majority agreement on pathogenic potential was achieved for only 3 of 12 parasites. When the more expert group was queried a second time, majority agreement was achieved for 8 of 12 parasites. Nevertheless, the predicted risk of subsequent disease still varied widely, from 1:10 to 1:1,000 for most parasites, and was unrelated to the perceived need for treatment. Almost all respondents thought asymptomatic adults with any intestinal parasites should always be treated. Transmission risk was judged to be low and was generally appropriate to the life cycle of the parasite.

The decision to treat or not to treat any condition in an asymptomatic patient should be based on a consideration of the risk of subsequent illness in the patient or his or her contacts and the cost, efficacy, and toxicity of available therapy. Most intestinal parasites can be eradicated or reduced to nonpathogenic numbers by the use of relatively inexpensive and nontoxic drugs. However, the probability that intestinal parasites will produce illness at some future date is unknown, although this question is of considerable interest, particular-

ly with regard to screening and therapy for highly parasitized immigrant and refugee groups in the United States.¹

The Delphi technique is a method of obtaining answers to questions that are issues of uncertainty by using a consensus of experts.² Responses obtained after feedback from a first round of inquiry usually yield more consistent and reliable opinions. In this paper this technique has been used to assess the natural history of untreated intestinal parasites and the necessity for treatment in asymptomatic adults now resident in westernized societies where reinfection is unlikely.

Methods

In 1980, the American Society of Tropical Med-

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Table 1. Expert Opinions Regarding the Probability That a Given Parasite Will Cause Disease in an Asymptomatic Adult (in percentages)

Parasite	More Expertise (n = 22)				Less Expertise (n = 24)				All Respondents (n = 46)			
	1:10	1:100	1:1,000	No Idea	1:10	1:100	1:1,000	No Idea	1:10	1:100	1:1,000	No Idea
Entamoeba histolytica	38	43	14	5	<u>70</u>	17	13	0	<u>54</u>	30	14	2
Giardia lamblia	48	43	10	0	<u>50</u>	<u>50</u>	0	0	49	47	5	0
Ascaris lumbricoides	14	31	<u>55</u>	0	20	41	39	0	17	36	47	0
Hookworm	10	19	<u>71</u>	0	4	39	<u>57</u>	0	7	30	<u>64</u>	0
Trichuris trichiura	7	17	<u>76</u>	0	9	23	<u>64</u>	5	8	20	<u>70</u>	2
Strongyloides stercoralis	43	43	10	5	39	30	26	4	41	36	18	5
Taenia saginata	31	38	21	10	11	33	<u>57</u>	0	20	35	40	5
Taenia solium	48	43	5	5	33	48	20	0	40	45	13	2
Hymenolepis nana	17	31	<u>52</u>	0	15	28	39	17	16	30	45	9
Fasciola hepatica	33	43	0	24	27	27	18	27	30	35	9	26
Paragonimus westermani	<u>60</u>	26	0	14	35	30	17	17	47	28	9	16
Schistosoma mansoni	36	40	19	5	28	41	30	0	32	41	25	2

NOTE: Majority opinions (>50%) are underlined. Percentages rounded up to nearest whole numbers may not sum to 100 percent. Percentages are based on numbers of responses; the minimum number of responses for any question was 42.

icine and Hygiene used mailers to its membership and national advertisements to obtain a list of 126 US physicians who considered themselves competent in clinical tropical medicine. A first questionnaire was mailed to 65 physicians from this list; the sample included all physicians who were board certified in infectious diseases, medicine, preventive medicine, or pediatrics, or who had a postdoctoral degree in tropical medicine, parasitology, or medical microbiology.

The first questionnaire consisted of a list of 12 potentially pathogenic parasites that can be found by stool examination in asymptomatic adults: Entamoeba histolytica, Giardia lamblia, Ascaris lumbricoides, hookworm, Trichuris trichiura, Strongyloides stercoralis, Taenia saginata, Taenia solium, Hymenolepis nana, Fasciola hepatica, Paragonimus westermani, and Schistosoma mansoni. Data were requested regarding the number of patients

seen with each parasite during the past year, the probability that each parasite, if found in an asymptomatic adult in the United States, would ever cause disease or be transmitted to another person, and a ranking regarding the necessity for therapy.

Data were analyzed for all respondents and separately for respondents judged to have more expertise, defined as a degree in tropical medicine, certification in medical microbiology or parasitology, or a self-report of having seen at least 100 patients with intestinal parasites during the preceding year. Results of the first survey and a second questionnaire similar to the first (which also queried confidence in each response) were sent to the more expert group, and analyses were repeated to determine consistency and confidence. Although the number of respondents is small, results are given in percentages for ease of comparison.

Table 2. Expert Opinions Regarding the Probability That an Untreated Adult Patient Will Transmit a Given Parasite to Others in the United States (in percentages)

Parasite	More Expertise (n = 22)				Less Expertise (n = 24)				All Respondents (n = 46)			
	Prob-able	Possible but Un-likely	Un-likely	Virtu-ally Im-possible	Prob-able	Possible but Un-likely	Un-likely	Virtu-ally Im-possible	Prob-able	Possible but Un-likely	Un-likely	Virtu-ally Im-possible
Entamoeba histolytica	36	<u>59*</u>	0	5	29	46	21	4	33	<u>52</u>	11	4
Giardia lamblia	43	39	9	9	15	<u>52</u>	21	13	28	46	15	11
Ascaris lumbricoides	14	9	27	<u>50</u>	8	13	<u>54</u>	25	11	11	41	37
Hookworm	9	9	36	46	4	8	<u>54</u>	33	7	8	46	39
Trichuris trichiura	5	14	36	46	4	22	48	26	4	18	41	36
Strongyloides stercoralis	5	46	27	23	8	25	46	21	7	35	37	22
Taenia saginata	0	5	28	<u>68</u>	0	8	13	<u>79</u>	0	7	20	74
Taenia solium	7	34	18	41	4	17	21	58	5	25	20	<u>50</u>
Hymenolepis nana	17	40	19	24	9	22	35	35	13	31	27	30
Fasciola hepatica	0	5	9	<u>86</u>	0	0	8	<u>92</u>	0	2	9	<u>89</u>
Paragonimus westermani	0	5	9	<u>86</u>	0	0	17	<u>83</u>	0	2	13	<u>85</u>
Schistosoma mansoni	5	0	14	<u>82</u>	0	0	17	<u>83</u>	2	0	15	<u>83</u>

*Majority opinions (>50%) are underlined

Results

Forty-six physicians completed the first questionnaire, for a response rate of 71 percent. Of these, 36 (78 percent) were board certified in medicine, pediatrics, or preventive medicine, and 24 (52 percent) were also board certified in infectious disease. Among the respondents 22 were judged to be more expert on the basis of a clinical tropical medicine degree (14 physicians), specialty training in medical microbiology (2) or parasitology (2), or having seen at least 100 patients with intestinal parasites during the preceding year (4). These 22 physicians were sent the second questionnaire, and 18 (82 percent) responded.

Table 1 shows the pathogenic potential of each parasite as perceived by all respondents. With the exception of E histolytica, rated as a 1 in 10 risk of future disease by 54 percent of these physicians,

the majority estimated disease risk as less than 1 in 10 for any intestinal parasite. Relatively few respondents indicated that they had no idea of the pathogenic potential of any given parasite, but majority agreement (greater than 50 percent) on pathogenic potential was achieved for only three of the 12 parasites, and individual predicted risk of subsequent disease varied widely. There were no striking differences in the responses of the more vs the less expert group.

Table 2 shows the respondents' opinion on the risk of parasite transmission by an asymptomatic adult resident in the United States. Only the protozoa, E histolytica and G lamblia, were thought to pose a significant risk to others, with 33 and 28 percent, respectively, responding that transmission was probable. Again, results generally were similar for the more and less expert groups,

Table 3. Expert Opinions Regarding the Necessity for Treatment of Asymptomatic Adult Patients With Given Intestinal Parasites (in percentages)

Parasite	More Expertise (n = 22)				Less Expertise (n = 24)				All Respondents (n = 46)			
	Always	Some- times	Never	Un- certain	Always	Some- times	Never	Un- certain	Always	Some- times	Never	Un- certain
Entamoeba histolytica	<u>86*</u>	14	0	0	<u>75</u>	25	0	0	<u>80</u>	20	0	0
Giardia lamblia	<u>64</u>	36	0	0	<u>63</u>	38	0	0	<u>63</u>	37	0	0
Ascaris lumbricoides	<u>73</u>	27	0	0	<u>63</u>	38	0	0	<u>67</u>	33	0	0
Hookworm	18	<u>68</u>	14	0	17	<u>71</u>	13	0	17	<u>70</u>	13	0
Trichuris trichiura	25	<u>61</u>	14	0	13	<u>67</u>	15	4	19	<u>64</u>	14	2
Strongyloides stercoralis	<u>96</u>	5	0	0	<u>69</u>	19	8	4	<u>82</u>	12	4	2
Taenia saginata	<u>82</u>	18	0	0	<u>60</u>	40	0	0	<u>71</u>	29	0	0
Taenia solium	<u>96</u>	5	0	0	<u>85</u>	15	0	0	<u>90</u>	10	0	0
Hymenolepis nana	48	48	5	0	35	31	21	13	41	39	13	7
Fasciola hepatica	<u>59</u>	36	0	5	38	29	4	29	48	33	2	17
Paragonimus westermani	<u>64</u>	32	0	5	42	42	4	13	<u>52</u>	37	2	9
Schistosoma mansoni	41	<u>59</u>	0	0	21	<u>75</u>	0	4	30	<u>67</u>	0	2

*Majority opinions (>50%) are underlined

although more than twice as many in the former group thought that giardiasis was likely to be transmitted. Parasites with a necessary soil cycle or intermediate host were assigned an expected low risk of transmission by most respondents.

Opinions regarding the necessity for treatment in asymptomatic adults with selected parasites are shown in Table 3. Physicians with more expertise were somewhat more likely to recommend treatment in all cases, but the overall responses were similar in both groups of respondents. More than one half of all respondents believed the *E histolytica*, *G lamblia*, *A lumbricoides*, *Strongyloides stercoralis*, *Taenia* sp, and *P westermani* should always be treated. Less than 15 percent of respondents identified any parasitic infections that never required treatment in an asymptomatic adult host.

In response to the second mailing, the proportion of experts who now stated that they had no idea about the risk of subsequent disease and the

perceived need for treatment remained essentially unchanged (Table 4). Again, most parasites had pathogenic potential predictions ranging from 1:10 to 1:1,000, but there was improved consensus about pathogenicity, with majority agreement for eight of the 12 parasites. A comparison of individual responses for those who answered both mailings failed to show any consistent pattern of increased or decreased expectation of pathogenicity (not shown). Most were relatively confident of their answers about pathogenicity; on a scale of 1 to 5 with 5 being the most certain, the mean response for each parasite ranged from 3.7 (for *E histolytica*) to 4.4 (for hookworm). Nevertheless, one third of the respondents had little confidence (rank 1 or 2) in their estimate of the potential pathogenicity of at least one parasite. Parasites so ranked by one or more physicians were *E histolytica*, *G lamblia*, *T saginata*, *H nana*, *F hepatica*, and *P westermani*.

Table 4. Estimates of Probability of Disease and Need for Treatment, Based on Second Mailing in Group With More Expertise (n = 18; results in percentages)*

Parasite	Probability of Disease				Need for Treatment			
	1:10	1:100	1:1,000	No Idea	Always	Sometimes	Never	Uncertain
Entamoeba histolytica	28	44	22	6	<u>100**</u>	0	0	0
Giardia lamblia	<u>56</u>	28	11	6	<u>67</u>	33	0	0
Ascaris lumbricoides	11	28	<u>61</u>	0	<u>83</u>	17	0	0
Hookworm	6	24	<u>71</u>	0	33	<u>67</u>	0	0
Trichuris trichiura	6	29	<u>65</u>	0	22	<u>67</u>	11	0
Strongyloides stercoralis	<u>56</u>	33	6	6	<u>83</u>	17	0	0
Taenia saginata	11	<u>56</u>	33	0	<u>72</u>	28	0	0
Taenia solium	6	<u>78</u>	11	6	<u>94</u>	6	0	0
Hymenolepis nana	6	17	<u>72</u>	6	39	<u>56</u>	6	0
Fasciola hepatica	39	28	17	17	<u>72</u>	28	0	0
Paragonimus westermani	<u>53</u>	12	12	24	<u>71</u>	24	0	6
Schistosoma mansoni	33	44	11	11	44	<u>56</u>	0	0

*In this table the minimum number of responses for any parasite was 17

**Majority opinions (>50%) are underlined

Discussion

The results of this survey are at once encouraging and discouraging. It is encouraging that physicians without special training in tropical medicine (more than one half of whom were board certified in infectious disease) agreed with most responses of physicians who had specific education or experience in the field, and that the responses with regard to transmissibility of specific parasites were consistent with a good understanding of the life cycle of these parasites, especially at a time when United States medical education in general and infectious disease training in particular pay little attention to parasitology.

The data are discouraging in that they clearly indicate how little is actually known about the natural history of asymptomatic parasitic infection. On the first mailing the only disease risks for which more than one half of all respondents agreed were a 1:10 risk of E histolytica-induced disease and a disease risk of 1:1,000 for hookworm or T trichiura. Those with more expertise were somewhat more apt to place more parasites in the low-risk (1:1,000) category. On the second mailing experts reached majority agreement about predicted pathogenicity for eight of the 12 parasites, and most said they were relatively confident about the validity of their predictions, but a wide range of predicted risk of subsequent illness persisted.

Further, both group and individual responses suggested that the need for treatment was unrelated to the expected pathogenic potential of any given parasite. The majority opinion that asymptomatic parasite infections should always be treated, despite the uncertainty about the natural history of parasitic infection, is consistent with the recommendations in recent textbooks.³⁻⁵

If treatment protocols are designed in accordance with majority opinion reported here, then it is clear that (1) all asymptomatic adults in North America with intestinal parasites should be treated, and (2) the decision to treat is based more on uncertainty than on a predicted high pathogenic potential or on the perceived risk of transmission for most intestinal parasites. The need for more definitive data on the natural history of intestinal parasitism in adults is amply demonstrated.

References

1. Barrett-Connor E: Direct dollar costs and savings of screening stool examinations for eggs and parasites in adult Southeast Asian refugees. *Am J Trop Med Hyg* 1982; 31:466-468
2. Pill J: The Delphi method: Substance, content, a critique and an annotated bibliography. *Socioecon Plann Sci* 1971; 5:57-71
3. Brown HW, Neva FA: *Basic Clinical Parasitology*, ed 5. E. Norwalk, Conn, Appleton-Century-Crofts, 1983
4. Katz M, Despommier DD, Gwadz RW: *Parasitic Diseases*. New York, Springer-Verlag, 1982
5. Strickland GT: *Hunter's Tropical Medicine*, ed 6. Philadelphia, WB Saunders, 1984