

# Intestinal parasites among presumably healthy individuals in Lebanon

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## ABSTRACT

**Objective:** To determine the prevalence period of intestinal parasites among presumably healthy subjects in Lebanon.

**Methods:** One stool specimen from 2634 presumably healthy Lebanese subjects, mean age 32.1 years with a range of 14-71 years, resident of different areas in Lebanon was examined for the presence of parasites. The analysis took place in the Clinical Microbiology Laboratory, Department of Pathology and Laboratory Medicine, American University of Beirut Medical Center, Beirut, Lebanon, over 25-months between 1995-1997.

**Results:** The prevalence of intestinal parasites was 12.4%. The most common parasites identified were *Escherichia coli* (3.8%), *Giardia lamblia* (3.1%) and *Entamoeba histolytica* (2.3%).

**Conclusion:** The data presented shows the need to improve hygienic conditions to contain the problem of intestinal infections with parasites in Lebanon.

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Parasitosis has long been recognized as an important health problem worldwide. Infection with pathogenic parasites has been associated with significant morbidity and mortality especially in the young, malnourished and immunosuppressed.<sup>1,2</sup> Growth stunting, wasting and anemia have been reported in children infested with pathogenic intestinal parasites.<sup>3</sup> The prevalence of parasitic infestation varies largely among different population groups, and is generally considered to be higher in tropical and subtropical countries, especially in those with lower socio-economic groups.<sup>4-6</sup> In developing countries, prevalence rates range from 30-60%, as compared to  $\leq 2\%$  in the developed countries.<sup>2,4</sup> In the United States of America (USA), infections with intestinal parasites are on the rise partly due to the increasing influx of immigrants from endemic areas.<sup>7</sup> Between 1992 and 1997 the incidence of giardiasis has increased to affect

2.5 million individuals annually in all major geographic areas of the USA.<sup>8</sup> In the Middle East and North Africa, studies on intestinal parasites was carried out on different population groups showed wide variations in prevalence rates. The highest rate reported was among Ethiopian immigrants in Israel (93%).<sup>9</sup> A prevalence of 53% was reported from Yemen.<sup>10</sup> In the Arabian Gulf States the prevalence ranged was 9-28%.<sup>11-16</sup> In one Asian country, Nepal, the rate was 44%.<sup>17</sup> In Lebanon, studies on the prevalence of parasitic infestations are scarce. In 1956, Watson et al<sup>18</sup> reported a prevalence rate of 85%, but the study had its limitations as it was restricted to certain localities in Lebanon and may not have been representative of the population at large. A decade later Uthman<sup>19</sup> reported an incidence rate of parasitic infestations of 58%, with *Ascaris lumbricoides* being

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the most prevalent parasite in the sample studied. Following a 15 year war, the country experienced rapid reconstruction accompanied by an influx of foreign workers from highly endemic countries such as Ethiopia, Eritrea, India, and Sri Lanka, where there is a high prevalence of intestinal parasites. In addition, a high percentage of expatriates work in Lebanon as housemaids, baby sitters and helpers in restaurants and hotels. Despite the fact that Lebanese law requires one stool culture and microscopy before issuing a work permit to those groups, flaws in the system and lack of serious control and follow-up prevail. In 1996 Araj et al,<sup>20</sup> reported the prevalence of parasitosis in random stool specimens collected at the American University of Beirut Medical Center (AUBMC), Beirut, Lebanon and compared them to a similar sample collected at the Islamic Hospital in Tripoli. The former being a tertiary health care center in Beirut while the latter hospital caters to a lower socio-economic community in North Lebanon. Prevalence rates were 8.5% at the AUBMC and 45.4% at the Islamic Hospital. Public awareness regarding the threat of parasitic infestations is gaining worldwide concern especially with the emergence of travel medicine, requiring substantiated knowledge on the prevalence of infectious diseases in countries of destination. The present study on a group of apparently healthy Lebanese subjects coming from all parts of Lebanon was undertaken in an effort to unveil the current status of intestinal parasitosis.

**Methods. Study population.** All Lebanese applicants for visas to work in Saudi Arabia are requested to undergo a medical check-up exclusively by physicians at the Department of Family Medicine at the AUBMC. Besides the physical examination, applicants are asked to take a chest x-ray, blood tests, urine analysis and submit one stool specimen for microscopy. Applicants are randomly assigned to one of 3 physicians who completed the standard form of the applicant's demographic data, records of the physical examination and laboratory findings. In this study, we present findings on 2634 applicants examined by 2 physicians over 25-months between 1995-1997.

**Stool analysis.** Stool specimens were normally examined for intestinal parasites within 2 hours of collection. The examination took place in the Clinical Microbiology Laboratory, Department of Pathology and Laboratory Medicine at the American University of Beirut Medical Center over 25-months between 1995-1997. Stool specimens were first grossly checked for the presence of complete or part of adult parasites then by light microscopy using a concentration technique (Fecal Parasite Concentrator, FPC, Evergreen Scientific, Los Angeles, Ca, USA). Briefly, one spoonful of stool specimen was mixed with 9ml of 10% formalin in a 15ml sterile tube. The mixture was kept at room temperature for 30 minutes for fixation. Three drops of Triton X-100 (surfactant) were added,

followed by 3ml of ethyl acetate to dissolve fat and reduce the bulk of stool. The mixture was transferred to a 15 ml centrifuge tube through the FPC strainer attached to the tube. This FPC strainer has a precision molded filter matrix (0.6 x 0.6 mm holes) that allows helminth eggs and larvae, protozoan cysts, and coccidian oocysts to pass but will retain the coarse particulate matter (excess fecal debris). After completing this filtration step, the tube was capped and centrifuged at 500x g for 10 minutes. The supernatant was decanted, and 3 drops of 10ml of 10% formalin was added and mixed with the sediment. Part of the latter was transferred to a slide and examined for parasites under the light microscope.

**Quality control.** Quality control measures include challenges on regular basis by the College of American Pathology (CAP) and the Agence Francaise De Secuite Santeira Des Produit de Sante, through the examination of unknown specimens. Moreover, each new lot of reagents is checked with a known stock of positive stool specimens for intestinal parasites.

**Statistical analysis.** Chi-square test was used to examine the significance of differences in the prevalence of intestinal parasites among groups, using Statistical Package for Social Sciences program, version 11.0.

**Results.** A total of 2634 visa applicant, mean age 32.1 year (range 14-71), submitted one stool specimen for examination. The prevalence of parasitic infections was 12.4%. The number and type of the identified parasites are presented in **Table 1**. The most common parasites encountered were *Entamoeba coli*, *Giardia lamblia*, and *Entamoeba histolytica*. The parasites least

**Table 1** - Prevalence of parasitic infections in presumably healthy adults in Lebanon.

Parasite species	Visa applicants N=2634 n (%)	Individuals with complete questionnaires N=1541 n (%)
<b>Protozoal infections</b>		
<i>Entamoeba coli</i>	100 (3.8)	66 (4.4)
<i>Entamoeba histolytica</i>	62 (2.3)	38 (2.5)
<i>Endolimax nana</i>	34 (1.3)	16 (1.0)
<i>Iodamoeba butschlii</i>	10 (0.4)	6 (0.4)
<i>Giardia lamblia</i>	82 (3.1)	58 (3.7)
<b>Helminthic infections</b>		
<i>Taenia species</i>	22 (0.8)	18 (1.2)
<i>Strongyloides stercoralis</i>	2 (0.1)	2 (0.1)
<i>Taenia species</i>	10 (0.4)	10 (0.6)
<i>Trichuris trichiura</i>	-	-
<i>Hymenolepis nana</i>	4 (0.2)	4 (0.3)
<b>Mixed specimens*</b>	21 (0.8)	16 (1.3)
*already incorporated under each parasite category.		

encountered in the stools were *Strongyloides stercoralis*, and *Hymenolepis nana*. Of the 2634 applicants, complete demographic data was available on 1541. Of the 1541 applicants, 1285 (83.4%) were males and 256 (16.6%) were females. There was no statistical difference in the incidence of parasitic infestations between the 2 groups (12.6% for males versus 15.6% for females) ( $p=0.191$ ; odds ratio [OR] 1.28; 95% confidence interval [CI] 0.88-1.87). The mean age was 31.5 years (SD= 9.22) for males versus 27.16 years (SD=5.53) for females. Intestinal parasites in this subgroup were detected in 202 individuals (13.1%). Fifty-eight percent of parasites were isolated from individuals applying to a blue-collar job versus 41.9% applying to a white-collar job; this difference was significant with  $p<0.05$  ( $p=0.040$ ; OR: 1.61; 95% CI: 1.02-2.55). Infestation was found to be highest among those subjects coming from the Northern part of the country, followed by Beqaa' and the South (Table 2). When compared to Beirut, and Mount Lebanon, the Beqaa' and the North had higher parasitic infections; the difference was significant. When parasites were classified as pathogenic versus non-pathogenic, the former was accounted for 59.4% of the total positive specimens in the sample (Table 2). The Beqaa' harbored the highest number of pathogenic parasites, followed by the North, and the South (Table 2). The presence of the parasites differed throughout the year. Prevalence of intestinal parasites was highest in subjects who presented during the summer season (39.6%) and the borderline was significant ( $p=0.052$ ; OR: 0.97; 95% CI: 0.83-1.20).

**Discussion.** This is a sentinel study on the prevalence of intestinal parasites in presumably healthy subjects from all areas of Lebanon. The overall prevalence rate of 12.4 % falls well within the range of 9-93% in the developing countries.<sup>4-6</sup> When compared to the earlier study from 2 hospitals in Lebanon which showed an overall rate of 18%, with a higher incidence (45%) in the Northern area as compared to Beirut

(8%), the overall lower prevalence rate in our current study could be due to the fact that the sample comprised presumably with healthy subjects. Our data confirm the findings of Araj et al<sup>20</sup> that the North province is more affected by the problem of intestinal parasitosis when compared to Beirut. The higher rate in the North, Beqaa', and South provinces reflect the poor hygienic conditions in these areas. Besides poor hygienic conditions, the South of the country had suffered marked war activities and invasions resulting in neglected and a low level of hygiene. Dietary practices, contamination of drinking water, lack of public health awareness, crowding and the presence of refugees in large numbers, all may have contributed to the high prevalence and spread of parasites. In line with other reports from different parts of the world, *Giardia lamblia* was the dominant intestinal pathogenic parasite isolated in our study. When compared to other countries, our prevalence rate of 3.1% was lower than those reported from Gaza (62%),<sup>3</sup> Argentina (20%),<sup>21</sup> Malaysia (19%),<sup>22</sup> Nepal (14%),<sup>14</sup> and Saudi Arabia (3.9%).<sup>11</sup> Notwithstanding, the populations studied this difference could be multi-factorial, which includes different weather conditions and unrestricted availability, use, and abuse of antiparasitic medications. Other studies reported seasonal variations in the prevalence of parasites in communities with an increase during summer months.<sup>8,20</sup> During this season, the use of water for drinking and for communal swimming predominate. These activities are common in Lebanon and may constitute another contributing factor. Some limitations in our study are noteworthy; the non-inclusion of children less than 10 years of age who normally have a peak parasitic prevalence is a significant drawback. Furthermore and despite the fact that a good majority of individuals infected with *Giardia* are usually asymptomatic,<sup>23</sup> the presumably healthy sample studied added to the fact that only one stool specimen was examined, constituted additional bias. Although comparative data with a similar study

**Table 2** - Distribution of intestinal parasites in 1541 specimens according to provinces.

District (N = 1541)	All parasites			Pathogenic parasites		
	n	(%)	Odds ratio (95% confidence intervals)	n	(%)	Odds ratio (95% confidence intervals)
Beirut (327)	30	(9)	1	16	(5)	1
North (255)	51	(20)	2.46 (1.48 - 4.12)	26	(10)	2.2 (1.11 - 4.42)
Mount Lebanon (407)	46	(11)	1.26 (0.76 - 2.11)	27	(6)	1.38 (0.7 - 2.74)
South (384)	45	(12)	1.31 (0.79 - 2.20)	33	(9)	2.10 (1.09 - 4.07)
Beqaa (168)	30	(18)	2.15 (1.21 - 3.84)	18	(11)	2.33 (1.10 - 4.96)

population are not available, the variable rates of intestinal parasites prevailing among healthy individuals indicate that infestations of this kind remain a problem in Lebanon. More efforts should be implemented towards improvement in hygienic practices, the overall sanitary conditions and in disseminating public health awareness among the population.

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