Short Report

Low prevalence of *Vibrio cholerae* O1 versus moderate prevalence of intestinal parasites in food-handlers working with health care personnel in Haiti

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Food-handlers with poor personal hygiene working in food-service establishments could be potential sources of infection due to pathogenic organisms. In May 2011, a cross-sectional study was undertaken to determine the prevalence of bacteria and intestinal parasites among food-handlers working with Cuban health personnel in Haiti. Stool specimens were collected from 56 food-handlers and samples were examined using standard procedures. Of the food handlers, 26.8% had one bacterial or intestinal parasite. The most prevalent species of organism found were *Blastocystis* spp. (9%), followed by *Vibrio cholerae* O1 serotype Ogawa, *Aeromonas* spp. and *Giardia intestinalis*, each one with 4%. The prevalence of intestinal parasites was 19.7%. Five out of 56 food handlers had diarrhea at the time the study was conducted. It was found that there was a lower prevalence of *V. cholerae* O1 serotype Ogawa in comparison to intestinal parasites. The study highlights the importance of the precautions that must be taken in cholera-affected countries by medical teams and their organizations, with emphasis on the preparation, processing, and serving of meals. The recommendation is to intensify continuing education programs, periodical laboratory examinations to detect carriers and food-handlers reporting sick, and to observe strict adherence to hygienic food-handling practices. In addition, food handlers with diarrhea should refrain from preparation or delivery of food.

Keywords: Food-handlers, Health care workers, Prevalence, Vibrio cholerae, Intestinal parasites, Haiti

Haiti has seen the worst epidemic of cholera in recent years affecting a single country. During the first year of the epidemic, almost 1000 health care workers (HCW) of the Cuban Medical Brigade in Haiti (CMBH) treated almost 76,000 Haitian patients suspected of having cholera.[1] The majority of these HCWs lived in 35 houses where Haitian or Cuban food-handlers (FH) prepared their meals (CMB, unreported data 2012).

Upon confirmation of the cholera epidemic in Haiti, the Cuban Ministry of Public Health (MINSAP) recommended all aid workers to take precautions and take protective measures, while working in Haiti, which included the preparation, processing, and serving of meals: (a) Drinking and using 'safe' water. (b) Only eating food that had been cooked well and served hot, including peeled fruits and vegetables, (c) Washing hands often with soap and water, (d) Using gloves for serving meals. In addition, all FH received training on cholera transmission and food service hygiene and sanitation practices.[2]

In May 2011, a cross-sectional study was conducted to investigate the prevalence of epidemic *Vibrio cholerae* O1, other enteropathogenic bacteria, and intestinal parasites in all 62 food-handlers working with health personnel of the CMBH. Food-handlers who had not had antibiotic or antiparasitic therapy within the two months prior to study were included. A stool sample was collected from each subject in a sterile stool cup and then transported during the first 72 h to Hôpital Communautaire de Référence (HCR) La Renaissance, Port au Prince using two Cary Blair transport media for bacteria and 10% formalin for parasites.[1,3] In addition, the samples were examined by direct wet mount and stained with iodine solution for protozoa[3] at 10 HCR sites belonging to all Haitian departments. At La Renaissance hospital, one Cary Blair tube was inoculated into Selenite broth medium (Oxoid), which was incubated at 37 °C overnight, and subcultured onto plates of *Salmonella-Shigella*

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agar, MacConkey agar, and Xylose Lysine Desoxycholate agar (Biolife, Italy) under similar conditions. The other Cary Blair tube was inoculated into alkaline peptone water (pH 8.5) for 6–8 h at 37 °C, plated onto Thiosulphate Citrate Bile Salt Sucrose (TCBS) agar (Biolife) and incubated at 37 °C overnight. All plates were examined, and bacterial species were identified by standard biochemical tests and serotyping.[4] In addition, the formalin ether concentration–sedimentation procedure was followed to increase the possibility of finding eggs or cyst forms of protozoa.[3] Ethical clearance was obtained from the Ethical Review Board of the CMBH, and informed consent was granted by each participant. Those FH who had any pathogenic organisms were treated as needed at the 10 HCR selected.[1,5]

Of 62 FH identified, a total of 56 (90.3%) were selected for stool screening of intestinal organisms and six were excluded because they had previously received antibiotics or antiparasitic drugs. Fifty of the 56 selected FH were Haitians and 6 were Cubans; the majority (82.1%) were females, with a median age of 45.21 years (range between 30 to 61 years old).

There are few reports on gastrointestinal pathogens transmission, distribution, and prevalence in Haiti.[6,7] This investigation is the first study developed in Haiti analyzing the prevalence of several enteropathogenic organisms in FH during the course of a large cholera epidemic. Stool examination revealed that 15/56 (26.8%) of FH had one bacterial or intestinal parasite. The most prevalent organisms were *Blastocystis* spp. (9%), followed by *V. cholerae* O1 serotype Ogawa, *Aeromonas* spp. and *Giardia intestinalis*, each one with 4%. Other intestinal organisms were detected with less frequency. The prevalence of intestinal parasites was 19.7%, of which 14.3% and 5.4% were protozoa and worms, respectively. The occurrence of pathogenic and nonpathogenic parasites was 16.1% and 3.6%, respectively. In addition, five (9%) of FH had diarrhea (Table 1).

Blastocystis spp. (9%) was the most frequent organism detected. The findings are in agreement with other reports in which this protozoan is the most prevalent in FH.[8,9]

Cholera constitutes the main cause of diarrhea in Haiti in recent years.[6,7] In the survey conducted for this study, both FH infected with *V. cholerae* O1 serotype Ogawa worked in the same house. The first was an asymptomatic Cuban woman working as chief cook; the other was her assistant, a Haitian man dedicated to peeling food but who did not cook or serve the food. The man had had mild diarrhea for two days, having attended a family dinner five days before the screening (interestingly another person from that family gathering also had diarrhea). Both infected FH were promptly treated with a single dose of 300 mg doxycycline, orally[1] and were excluded from work until each had two consecutive negative stool cultures taken at intervals of 24 h. In addition, all 52 HCW who consumed foods in that house were asked to provide a fresh stool sample for screening of *V. cholerae,* which resulted to be 100% negative and all 52 HCW were found to be free of symptoms of cholera.

Giardia intestinalis is a common cause of infection in Haiti.[10] Similar prevalence of this protozoan infection in FH had been previously reported.[11] A*eromonas* spp, is a gastrointestinal infection transmitted by food or water and FH play an important role in the contamination of foods.[12] The intestinal helminthes *Ascaris lumbricoides*, and *Enterobius vermicularis* have been observed with identical frequency in several investigations conducted in FH in Ethiopia[13] and Kenya.[14] Although *Entamoeba coli* and *Endolimax nana* are non-pathogenic protozoa, their presence among the study participants are important bioindicators of the persistence of unhygienic behaviors that increase the risk of cholera and other infectious diseases dependent on fecal–oral transmission.[14]

In the study conducted, the overall prevalence of intestinal parasites in FH was 19.7%. Higher prevalence of intestinal parasites in this group had been reported in Ethiopia, 45.3%[13] and Brazil, 28%[15], however lower prevalence had been reported in Kenya, 15.7%[14] and Iran, 9%.[11] This discrepancy may be largely due to epidemiological, environmental distribution difference, poor personal hygiene practices, environmental sanitation, and ignorance of health-promotion practices.[13]

International food regulations recommend that FH should be in a good health and those suffering from diarrhea, which are especially likely to contaminate food and the environment must be excluded from work until they

Table 1 Prevalence of intestinal organisms in 56 food handlers working with health care personnel of the Cuban Medical Brigade in Haiti, May 2011

Organism identified	Number	Prevalence% (95% confidence interval)
Blastocystis spp*	5	9 (2.96–19.62)
Vibrio cholerae O1, Ogawa*	2	4 (0.43–12.31)
*Giardia intestinalis**	2	4 (0.43–12.31)
Aeromonas spp.	2	4 (0.43–12.31)
Ascaris lumbricoides	1	2 (0.04–9.55)
Enterobius vermicularis	1	2 (0.04–9.55)
Endolimax nana	1	2 (0.04–9.55)
Entamoeba coli	1	2 (0.04–9.55)

*Three food-handlers with *Blastocystis* infection and one each with *V. cholerae* O1 and *G. intestinalis* infection had diarrhea at the time of screening.

are completely free of symptoms.[5] It was noted in this study that 5 out of 56 FH had diarrhea. A large number of *Blastocysts* spp. cysts (more than 5 per microscopic field, at 400 X magnification), active trophozoite forms of *G. intestinalis,* and a cholera case were observed in the FH with diarrhea as described in Table 1.

The study had the following limitations: There were no investigations done on the health status and personal hygiene of FH, their knowledge or food service hygiene and sanitation practices, associated risk factors for transmission, nor of the sanitary conditions of their homes. Only one stool sample was collected per individual and the diagnostic method used for Enterobius was not the recommended to recover the eggs of this parasite. In addition, no molecular or genomic testing was conducted to demonstrate evidence of transmission in *V. cholerae* isolates recovered from two FH working in the same house.

In conclusion, after the first seven months of the cholera epidemic in Haiti, a lower prevalence of *V. cholerae* O1 in comparison to intestinal parasites as a whole were found in FH working with health care personnel in Haiti. Most individuals infected with *V. cholerae* biotype El Tor, remained asymptomatic or experienced only mild diarrhea. Screening to identify asymptomatic carriers among personnel working in cholera-affected areas may help to develop strategies for the prevention of cholera transmission and for Global Health Protection.[16] This study highlights the importance of the precautions that need to be taken by medical teams and their organizations in cholera-affected countries, with emphasis in the preparation, processing, and serving of meals.

It is recommended that continuing education programs be intensified, that periodical laboratory examinations be conducted to detect carriers and FH reporting sick, and that there be strict adherence to hygienic food-handling sanitation practices by FH working with HCW of the CMBH. In addition, staff that is found to be infected or are carriers and those with diarrhea should refrain from participating in the preparation or delivery of food.

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