Parasitology International 63 (2014) 456–462

Contents lists available at ScienceDirect

Parasitology International

journal homepage: www.elsevier.com/locate/parint

Differences in prevalence of parasites in stool samples between three distinct ethnic pediatric populations in southern Israel, 2007–2011

Shalom Ben-Shimol [a,*], Orli Sagi [b], David Greenberg [a]

[a] Pediatric Infectious Disease Unit, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel
[b] Parasitology Laboratory, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel

ARTICLE INFO

Article history:
Received 23 May 2013
Received in revised form 23 October 2013
Accepted 25 October 2013
Available online 5 November 2013

Keywords:
Ova and parasites
Stool
Intestinal parasitic infections
Epidemiology

ABSTRACT

Intestinal parasites cause significant morbidity worldwide, particularly in developing populations. At least three pediatric populations reside in southern Israel: the Bedouin population, the general Jewish population and Jewish children of Ethiopian origin. Our aim was to compare intestinal parasite prevalence between the three pediatric populations in southern Israel.

This is a retrospective, laboratory, population-based surveillance. Most ova and parasite (O&P) tests in southern Israel (hospital and community obtained) are performed by the hospital parasitology laboratory. All pediatric stool O&P tests examined by the hospital laboratory between 2007 and 2011 were included.

Overall, 45,978 samples were examined; 27,354, 16,969 and 1655 from Bedouin, non-Ethiopian Jewish and Ethiopian children, respectively. 16,317 parasites were identified in 12,325 (26.8%) positive samples. Total prevalences were 36%, 11% and 46% for Bedouin, non-Ethiopian Jewish and Ethiopian children, respectively.

Blastocystis hominis, *Giardia lamblia* and *Entamoeba* species were the most common parasites identified, constituting ≥80% of positive samples in all groups. *Hymenolepis nana* was rarely identified in non-Ethiopian Jewish children (0.04% of isolates compared with 2.6% and 0.5% in Bedouin and Ethiopian children, respectively). Other helminths, excluding *H. nana* and *Enterobius vermicularis*, were identified almost exclusively in Ethiopian children ≥5 years of age.

In conclusion, the Bedouin and Ethiopian children were characterized by higher parasite prevalence in stool, compared with the non-Ethiopian Jewish children, probably reflecting higher intestinal parasitic disease rates. Certain helminthic infections were identified almost exclusively in the Ethiopian children. These differences may be associated with lifestyle differences between the three populations.

1. Introduction

Intestinal parasites cause significant morbidity and mortality throughout the world, particularly in developing populations [1–10]. Large population studies describing intestinal parasitic infection (IPI) prevalence are scarce in developed populations [3,5].

Intestinal parasitic diseases were found to be associated with several factors, including poverty, illiteracy, young age, seasonality, environmental conditions, exposure to livestock and poor hygiene [1–12]. Infections transmitted through ingestion of contaminated food, water or soils were more common among young children than among adolescents and adults [4–7,11–13].

The stool ova and parasite (O&P) test is the main diagnostic tool for identifying IPI. It is used in many clinical situations, as a routine work-up of patients with acute or chronic diarrhea, blood in the stools, abdominal pain and other situations suggestive of IPI [1,4,5].

In southern Israel (the Negev region), the Jewish and the Bedouin (Arab Muslims) populations live side by side, with considerable living condition disparity. Although the socio-economic conditions and the lifestyles of the two groups differ, both have access to the same medical services. The Jewish population is comparable to a Western population and is mainly urban, whereas the Bedouin population, formerly desert nomads, is in transition to a Western lifestyle. Contact between the two populations is rare, outside the hospital setting, as the vast majority of the Bedouin population lives in Bedouin towns and villages. The Bedouin population is characterized by overcrowding, lower levels of education, lower income and larger family size than the Jewish population. Certain IPI (e.g. giardiasis and cryptosporidiosis) have been reported as important causes of diarrhea in Bedouin children. It was suggested that zoonotic risk factors (exposure to livestock) and poor hygiene are contributory factors [13–15].

Less than 4% of the Jewish pediatric population in southern Israel are of Ethiopian origin. This population immigrated to Israel mainly in 2 waves, in the 1980s and 1990s. The Ethiopian population is characterized by low socio-economic status, and due to cultural background tends to live in closed communities. This population was reported to have higher rates of parasitic infections, including IPI [16–18].

* Corresponding author at: Pediatric Infectious Disease Unit, Soroka University, Medical Center, Beer-Sheva 84101, Israel. Tel.: +972 8 6400547; fax: +972 8 6232334.
E-mail address: shalomb2@clalit.org.il (S. Ben-Shimol).

1383-5769/$ – see front matter © 2013 Elsevier Ireland Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.parint.2013.10.013

The aim of this study was to compare the prevalence of intestinal parasites between three ethnic pediatric populations in southern Israel. We evaluated the association between age, gender and seasonality on overall and parasite-specific prevalence.

Determining IPI prevalence for the 3 populations may allow targeted interventions to reduce the IPI burden.

2. Materials and methods

2.1. Study design

A retrospective, laboratory, population-based surveillance, initiated in January 2007, conducted by the Pediatric Infectious Disease Unit (PIDU) and the parasitology laboratory at the Soroka University Medical Center (SUMC). This report presents data spanning over a 5-year period, 2007–2011.

2.2. Setting

In the year 2010, the pediatric population of southern Israel included ~257,000 children aged 0–19 years old; 35,400 and 37,400 Bedouin and Jewish children <5 years old, respectively, and 85,400 and 98,800 Bedouin and Jewish children 5–19 years old, respectively (Israeli Central Bureau of Statistics data).

Less than 4% of the Jewish pediatric population in southern Israel are of Ethiopian origin (5000 children 0–19 years of age in the year 2010).

The vast majority of the Bedouin population lives in Bedouin towns and villages. Thus, children were identified as Bedouin children according to their place of residence and location of the referring clinic. Jewish children of Ethiopian origin were identified according to the country of origin of the children and their parents.

Medical insurance in Israel is universal and is provided free of charge. There are no apparent financial or other barriers for health care service use in the region. More than 80% of Bedouin children and ~70% of Jewish (Ethiopians and non-Ethiopians) children in southern Israel are insured by the General Health Insurance Plan (GHIP) [19]. All community obtained stool samples from the GHIP insured population are sent to the Soroka University Medical Center (SUMC) parasitology laboratory.

Furthermore, nearly all residents of southern Israel are being treated at the SUMC (the only hospital in the region), and all stool samples obtained from hospitalized patients (regardless of their medical insurance) are performed by the SUMC parasitology laboratory.

2.3. Case definition: intestinal parasitic infection episode

The finding of a parasite in a stool O&P test, performed at the SUMC parasitology laboratory between 2007 and 2011. All samples were obtained from children 0–19 years old.

When more than one stool sample was tested for the same patient, we excluded tests performed less than 30 days after a previous exam, similarly to another report [20]. Repeat samples from the same children were included if they were obtained during the study period at >30 day intervals.

2.4. Study population

All southern Israel children (0–19 years), with stool O&P samples (both hospital- and community-obtained) examined at the SUMC parasitology laboratory, between 2007 and 2011, were included.

2.5. Data collection

Demographic and clinical information was retrospectively obtained from all subjects with stool O&P test. Demographic information included patient's birth date, gender and ethnicity. Clinical data included testing date and results. The study was approved by the SUMC Ethics Committee.

2.6. Parasite identification

Each stool specimen reaching our laboratory was routinely subjected to the following treatment: 1) Sedimentation procedure for detection of worm eggs or larvae, protozoan trophozoites and cysts; 2) Culture for isolation of *Entamoeba* species. No test was used to differentiate between *Entamoeba histolytica* and *Entamoeba dispar*.

a) Sedimentation procedure — 2 g of fresh stool samples were placed in a round tube containing 5 ml of saline 0.9%. Stools were mixed and were filtrated using gauze formed into a conical tube. Filtrated samples were incubated in 4 °C for 24 h and supernatant fluid was decanted. The sediment samples were analyzed by microscopic examination (×10 and ×40 magnification), with or without lugol stain for the detection of worm eggs or larvae, protozoan trophozoites and cysts.
b) Culture — 2 g of fresh stool samples were placed in a culture tube containing medium based on Boeck & Drbohlav Locke formulation (hy-entamoeba kit; hy-labs, Israel). Cultures were incubated at

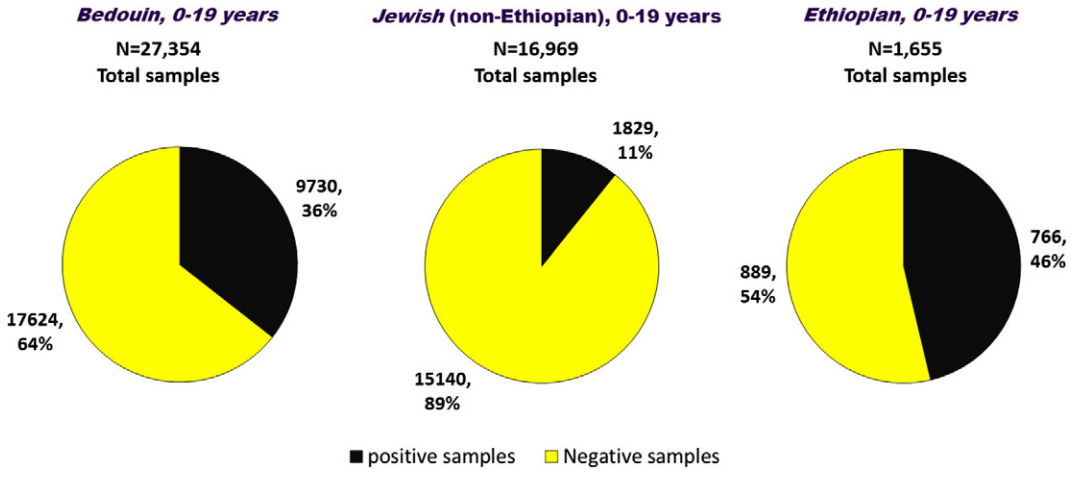

Fig. 1. Proportion of Bedouin, Jewish and Ethiopian children (0–19 years) positive for at least 1 parasite in stool exams, 2007–2011.