sciendo

DOI 10.2478/helm-2018-0039

HELMINTHOLOGIA, 56, 1: 53 – 56, 2019

Case Report

Multiple parasitic infestation in a nine-month-old patient: a case report

J. INTRA[1]*, C. SARTO[1], E. MANULI[1], P. M. VANNINI[2], P. BRAMBILLA[1]

[1]Department of Laboratory Medicine, University of Milano-Bicocca, Desio Hospital, via Mazzini 1, Desio (MB), Italy,
*E-mail: *jari.intra@unimi.it*; [2]Dipartimento Cure Primarie ATS Brianza, Monza, Italy

Article info

Received September 22, 2018
Accepted November 15, 2018

Summary

We are reporting the case of a nine-month-old Pakistani female with complaint of growth retardation who presented multiple intestinal parasitic infections. Probably because of contamination with fecal matter, the initial microscopic examination of the urinary sample revealed the presence of eggs of *Enterobius vermicularis*, cysts of *Entamoeba coli*, and an organism similar to mites. Stool samples were obtained after two weeks and microscopic investigation confirmed the presence of *Enterobius vermicularis* eggs, cysts of *Entamoeba coli*, and hookworm eggs. The patient was immediately subjected to mebendazole therapy associated with trimethoprim-sulfamethoxazole, to which she responded well. Follow-up stool re-examinations performed 15 and 30 days after the treatment tested negative for all parasitic ova and cysts. This study reflects the importance of considering multiple parasitic infestations in low socio-economic populations and highlights the need of improving poor hygienic conditions to prevent such infections, in particular in children.
Keywords: polyparasitism; *Enterobius vermicularis*; hookworm; *Entamoeba coli*; infestations

Introduction

Intestinal parasites are widely distributed around the world with and infestation rates varying depending on the country of residence and the age of the exposed subjects (Manganelli *et al*., 2012; Gyang *et al*., 2017). Globally, more than 3.5 billion people are infected by intestinal parasites, including soil-transmitted helminthes, such as *Ascaris lumbricoides*, *Trichuris trichiura*, hookworm, and protozoa such as *Giardia intestinalis* and *Entamoeba* spp. (Hotez *et al*., 2009; Manganelli *et al*., 2012). Higher prevalence rates of intestinal parasitic infections have been recorded in developing countries, which are considered endemic for most of these parasitic infections. Indeed, poverty, lack of access to clean water, poor hygiene, malnutrition, and hot and humid climate are the most common risk factors for the widespread of intestinal parasites (Hotez *et al*., 2009). In particular, over 800 million preschool- and school-age children live in areas where parasite prevalence and transmission are elevated (Harhay *et al*., 2010; Zemene and Shiferaw, 2018) and their yet not fully developed immune system makes them more susceptible to parasitic infections (Harhay *et al*., 2010; Zemene and Shiferaw, 2018). Before the year 2000, Italy was considered an endemic area for numerous parasites (e.g. *Entamoeba* spp., *G. duodenalis*, *Dientamoeba fragilis*, *T. trichiura*, *Strongyloides stercoralis*, *Ancylostoma duodenale*, *A. lumbricoides*, *Hymenolepis nana*, *Taenia* spp, *Echinococcus granulosus*, and *Enterobius vermicularis*) (Belli *et al*., 2014). Currently, in Italy, the infection rates due to parasites are low, even though only limited epidemiological data have been collected. Crotti *et al.* (2013) showed that the most common intestinal parasites identified in Italy between 2005 and 2008 were *S. stercolaris* and *E. vermicularis*, among heltminthes, and *G. intestinalis* and *Entamoeba* spp., among protozoa. In endemic countries, intestinal parasitosis rep-

* – corresponding author

resents a social and economic burden (Abou-Shady *et al*., 2011; Manganelli *et al*., 2012), while in industrialized countries the major groups at risk of parasitosis are immigrants and nomad populations (Manganelli *et al*., 2012; Barnes *et al*., 2017). Depending on the parasite, transmission can occur via direct person-to-person contact or because of contact with a contaminated source (i.e. food, water, soil) (Hotez *et al*., 2009; Someshwaran *et al*., 2015; Gyang *et al*., 2017). Co-infection with two or more parasites is accidental and is associated with increased risk of morbidity, higher mortality rates and susceptibility to other infections (Supali *et al*., 2010; Gyang *et al*., 2017). In children, parasitic infestations can be responsible for malabsorption, leading to growth and cognitive development retardation (Manganelli *et al*., 2012). Pre-school and school age children thus present higher risk of worse health outcomes due to polyparasite infestations, compared to monoparasitosis (Supali *et al*., 2010). The aim of this case report was to show that poor socio-economic conditions and living in disadvantageous conditions of immigrants can significantly compromise health status also in developed countries, and the efforts to improve hygienic conditions and sanitation can decrease the vulnerability, in particularly of children, to parasitic infestations.

Ethical Approval and/or Informed Consent

Informed consent has been obtained from all individuals included in the study.

Case presentation

On June 21th, 2018, the urine sample from an outpatient nine-month-old female was received at the laboratory of Desio Hospital (Lombardy, Italy). The child was born in Italy from Pakistani parents arrived in Italy a few months before, had a medical history of growth retardation without the diagnosis of other diseases. The urine sample, contaminated with fecal matter, was analysed by microscopy. The analysis revealed the presence of *E. vermicularis* eggs (Fig. 1A) and *Entamoeba coli* cysts (Fig. 1B). Surprisingly, the analysis of the urinary sediment revealed also the presence of an organism similar to mites (Fig. 1C). However, after cutaneous examination, skin lesions indicating the invasion of ectoparasites were not reported. There was no eosinophilia in the peripheral blood, and bacteriological urine test was not required. The child was receiving artificial milk. Although parents and pediatrician were promptly informed about parasitic infestations, a fecal specimen of the patient was obtained only two weeks after the first examination. On July 6th, three stool samples preserved in the Universal Fixative solution (UNIFIX®, Medical Chemical Corporation, Torrance, CA) were sent to the Microbiology laboratory, and, after concentration, examined for ova and parasite (O & P). The presence of cysts of the protozoan *E. coli* (Fig. 1D) and eggs of the nematode *E. vermicularis* (Fig. 1E) was confirmed. Additionally, hookworm eggs measuring 55 – 60 µm in length and 35 – 40 µm in width were also observed (Fig. 1F). Collectively, the patient presented a co-infection with three parasites: two helminthes and a protozoan. No parasites were found in the stool samples obtained from the parents. Mebendazole (100 mg once a day for three days, repetition of the regimen one week later) associated with trimethoprim and sulfamethoxazole (100 mg + 800 mg for 15 days) were immediately started and, 15 and 30 days after the treatment, microscopic stool re-examination revealed no parasitic ova or cysts.

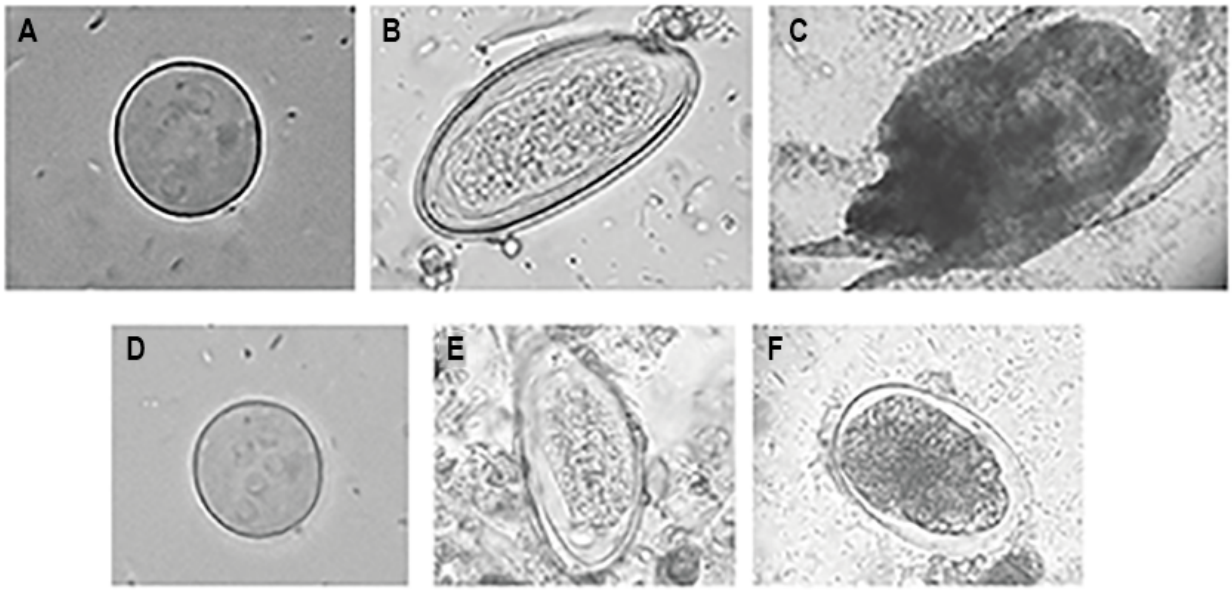

Fig. 1. Urine sediment analysis: (**A**) Cyst of *Entamoeba coli*; (**B**) Egg of *Enterobius vermicularis*; (**C**) Organism similar to mites. Microscopic stool examination: (**D**) Cyst of *Entamoeba coli*; (**E**) Egg of *Enterobius vermicularis*; (**F**) Egg of hookworm.

Discussion

The risk for parasitic infections, at both individual and community level, is associated with a complex and multivariate group of demographic, biological, social, environmental and behavioral factors. In endemic countries, poor hygienic conditions represent the most important risk factor for the diffusion and acquisition of intestinal parasitic infections (Hotez *et al*., 2009; Someshwaran *et al*., 2015; Gyang *et al*., 2017). Repeated infections with the same or different parasites are a common occurrence, and the simultaneous infection with multiple organisms can occur. In particular, polyparasitism increases morbidity and susceptibility to other infections (Manganelli *et al*., 2012; Someshwaran *et al*., 2015; Gyang *et al*., 2017; Wesolowska *et al*., 2018). The expansions in people travelling and immigration has contributed to increase the number of cases reported outside endemic areas (Manganelli *et al*., 2012; Barnes *et al*., 2017; Wesolowska *et al*., 2018). In several areas considered non-endemic, such as Europe, USA, Gulf States, migration from developing countries contributed to an increased number of parasite infections (Abu-Madi *et al*., 2010; Norman *et al*., 2015a, 2015b).

In Italy, among the immigrant communities coming from Eastern Europe, Africa, Asia, and Central and South-America, the prevalence of intestinal parasite was 2.6 times higher than that of non-immigrant groups (Masucci *et al*., 2011). In particular, Manganelli *et al*. (2012) observed that, among children aged between 0 and 15 years of European, African, Asian, and South-American origin, 15 % were infected by parasites, and prevalence rate increases when they live in shacks or if poor sanitary conditions persist, even after a longer stay in Italy.

The case here presented underlies that the simultaneous parasitic infections can also occur in immigrant children from zero to one-year old, especially during weaning, when the immune system is yet immature (Simon *et al*., 2015). It is very difficult to demonstrate if those infections were acquired locally or were imported, however, *Enterobius vermicularis* and *Entamoeba* spp. are two of the most common parasites detected in Italy (Crotti *et al*., 2013). In Pakistan, the commonest intestinal parasitic infestations are due to *Ascaris lumbricoides*, *Giardia intestinalis*, *Entamoeba* spp., and in minor prevalence to *Enterobius vermicularis* and hookworms (Ullah *et al*., 2014). However, a close relationship between socio-economic conditions and parasitism exists. The presence of organism similar to mites, hookworm and *E. vermicularis* eggs, and cysts of *Entamoeba* spp. confirms that poor sanitary and environmental hygiene can favor contamination and interpersonal parasites transmission, even in developed countries. In fact, the transmission of hookworm and *E. vermicularis* can either occur through contaminated soil or via fecal-oral route, while *Entamoeba* spp. can be acquired through contaminated food and water. Moreover, malnutrition leads children to grow at rates below normal values, making them more vulnerable to infections with one or more parasites, although this possible association is still under debate (Manganelli *et al*., 2012; Someshwaran *et al*., 2015; Gyang *et al*., 2017).

Conclusion

Improving socio-economic conditions could be useful to safeguard people, particularly children, from parasitic infections. Although difficult to perform, mass or periodic stool examinations in endemic areas as well as among high-risk groups in industrialized countries could be helpful to achieve an early diagnosis and reduction in transmission. Improving health education, environmental and personal hygiene, and nutrition quality appear as preventive measures that could contribute to control the risk of parasite transmission and infection. Finally, any reported case of intestinal parasite infestations in children enhance the knowledge on epidemiology, persistence and risk factors.

Acknowledgments

We gratefully acknowledge Laura Colombo, Marco Santambrogio, Elena Crippa, Antonio Pacifico, and Silvio Caimi from Desio Hospital for technical support. We also thank Dr. Natalia Tiberti and Dr. Elena Intra for reviewing the manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

References

Abou-Shady, O., El Raziky, M.S., Zaki, M.M., Mohamed, R.K. (2011): Impact of Giardia lamblia on growth, serum levels of zinc, copper and iron in Egyptian children. *Biol. Trace Elem. Res*., 140: 1 – 6. DOI: 10.1007/s12011-010-8673-6

Abu-Madi, M.A., Behnke, J.M., Doiphode, S.H. (2010): Changing trends in intestinal parasitic infections among long-term-residents and settled immigrants in Qatar. *Parasit. Vectors.,* 3: 98. DOI: 10.1186/1756-3305-3-98

Barnes, A.N., Davaasuren, A., Baasandagva, U., Gray, G.C. (2017): A systematic review of zoonotic enteric parasitic diseases among nomadic and pastoral people. *PLoS ONE*., 12(11): e0188809. DOI: 10.1371/journal.pone.0188809

Belli, A., Coppola, M.G., Petrullo, L., Lettieri, G., Palumbo, C., Dell'Isola, C., Smeraglia, R., Triassi, M., Spada, E., Amoroso, P. (2014): The current spectrum and prevalence of intestinal parasitosis in Campania (region of southern Italy) and their relationship with migration from endemic countries. *Int. J. Infect*., 29: 42 – 47. DOI: 10.1016/j.ijid.2014.04.021

Crotti, D., Bernieri, F., Raglio, A., AMCLI-CoSP Group Study. (2013): Epidemiology of intestinal parasitosis in Italy between 2005 and 2008: diagnostic techniques and methodologies. *Microbiol. Med*., 28(1). DOI: 10.4081/mm.2013.2274

Gyang, V.P., Chuang, T.W., Liao, C.W., Lee, Y.L., Akinwale, O.P., Orok, A., Ajibaye, O., Babasola, A.J., Cheng, P.C., Chou, C.M., Huang, Y.C., Sonko, P., Fan, C.K. (2017): Intestinal parasitic infections: Current status and associated risk factors among school aged children in an archetypal African urban slum in Nigeria. *J. Microbiol. Immunol. Infect*., DOI: 10.1016/j.jmii.2016.09.005

Harhay, M.O., Horton, J., Olliaro, P.L. (2010): Epidemiology and control of human gastrointestinal parasites in children. *Expert. Rev. Anti. Infect. Ther*., 8: 219 – 234. DOI: 10.1586/eri.09.119

Hotez, P.J, Fenwick, A., Savioli, L., Molyneux, D.H. (2009): Rescuing the bottom billion through control of neglected tropical diseases. *Lancet*, 373: 1570e5. DOI: 10.1016/S0140-6736(09)60233-6

Manganelli, L., Berrilli, F., Di Cave, Ercoli, L., Capelli, G., Otranto, D., Giangaspero, A. (2012): Intestinal parasite infections in immigrant children in the city of Rome, related risk factors and possible impact on nutritional status. *Parasit. Vectors*., 20: 265. DOI: 10.1186/1756-3305-5-265

Masucci, L., Graffeo, R., Bani, S., Bugli, F., Boccia, S., Nicolotti, N., Fiori, B., Fadda, G., Spanu, T. (2011): Intestinal parasites isolated in a large teaching hospital, Italy, 1 May 2006 to 31 December 2008. *Euro Surveill*., 16: 16(24)

Norman, F.F., Monge-Maillo, B., Martínez-Pérez, Á, Perez-Molina, J.A., López-Vélez, R. (2015a): Parasitic infections in travelers and immigrants: part I protozoa. *Future Microbiol*., 10(1): 69 – 86. DOI: 10.2217/fmb.14.105

Norman, F.F., Monge-Maillo, B., Martínez-Pérez, Á., Perez-Molina, J.A., López-Vélez, R. (2015b): Parasitic infections in travelers and immigrants: part II helminths and ectoparasites. *Future Microbiol*., 10(1): 87 – 99. DOI: 10.2217/fmb.14.106

Simon, A.K., Hollander, G.A., McMichael, A. (2015): Evolution of the immune system in humans from infancy to old age. *Proc. R. Soc. B*., 282: 20143085. DOI: 10.1098/rspb.2014.3085

Someshwaran, R., Nachammai, S.M. (2015): A Rare Case Report Of Intestinal Hymenolepiasis And Ascariasis Double Infection In A Symptomatic Immuno-Competent Host From South India. *IJMSCI*, 11(2): 1443 – 1447

Supali, T., Verweij, J.J., Wiria, A.E., Djuardi, Y., Hamid, F., Kaisar, M.M., Wammes, L.J., van Lieshout, L., Luty, A.J., Sartono, E., Yazdanbakhsh, M. (2010): Polyparasitism and its impact on the immune system. *Int. J. Parasitol*., 40(10): 1171 – 1176. DOI: 10.1016/j.ijpara.2010.05.003

Ullah, W., Shah, A., Jamal, Q., Ullah, S., Muhammad, I., Ullah, H. (2014): Prevalence of intestinal parasites among school children in district Upper Dir, Khyber Pakhtunkhwa Pakistan. *Int. J. Biosci*., 5(1): 1 – 8.

Wesolowska, M., Rymer, W., Kicia, M., Popiolek, M. (2018): Concurrent infection of a young tourist by hookworm and *Strongyloides stercoralis* during low budget travel in Southeast Asia. *Helmintologia*., 55: 166 – 172. DOI: 10.2478/helm-2018-0007

Zemene, T., Shiferaw, M.B. (2018): Prevalence of intestinal parasitic infections in children under the age of 5 years attending the Debre Birhan referral hospital, North Shoa, Ethiopia. *BMC Res. Notes*., 11(1):58. DOI: 10.1186/s13104-018-3166-3

Zonta, M.L., Oyhenart, E.E., Navone, G.T. (2010): Nutritional status, body composition, and intestinal parasitism among the Mbyá-Guaraní communities of Misiones, Argentina. *Am. J. Hum. Biol*., 22: 193 – 200. DOI: 10.1002/ajhb.20977