Epidemiological Study of *Strongyloides stercoralis* With a Comparative Diagnostic Approach, in Lorestan, West of Iran

Ebrahim Badparva ¹; Hassan Nayebzadeh ²,*; Malek Hossein Barkhordari ³; Behrooz Ezzatpour ⁴

¹Department of Parasitology and Mycology, Lorestan University of Medical Sciences, Khorramabad, IR Iran
²Department of Pathobiology, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, IR Iran
³Department of Health Deputy, Lorestan University of Medical Sciences, Khorramabad, IR Iran
⁴Medical Herbs Research Center, Lorestan University of Medical Sciences, Khorramabad, IR Iran

*Corresponding author: Hassan Nayebzadeh, Department of Pathobiology, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, IR Iran. Tel.: +98-9166675416, Fax: +98-661235999, E-mail: hassannayeb@yahoo.com

Received: December 11, 2013; Accepted: January 1, 2014

**Background:** *Strongyloides stercoralis* causes strongyloidiasis, one of the major parasitic infections in human worldwide.

**Objectives:** This study was carried out to examine the prevalence of *S. stercoralis* in the state of Lorestan, west of Iran, using a comparative diagnostic approach.

**Materials and Methods:** Stool specimens from a random population sample were examined with light microscope, using direct fecal smear, formalin-ether concentration, and nutrient agar plate culture.

**Results:** The prevalence of *S. stercoralis* in this study was 0.07%. The statistical random sample in this study was 2839 people whose stool specimens were collected and examined using nutrient agar plate culture. The results showed only two infected persons. The same procedure was administered using direct fecal smear and formalin-ether concentration, which showed no result.

**Conclusions:** As a precautionary measure, a stool test based on nutrient agar plate culture is recommended for detection of *S. stercoralis*.

**Keywords:** *Strongyloides stercoralis*; Prevalence; Feces

---

1. **Background**

Strongyloidiasis is endemic in almost all parts of the world from Asia, to southeast Asia, to Africa and central and south America (1). In 1876, for the first time, *Strongyloides stercoralis* was observed in stool samples of on duty French soldiers in Vietnam. The soldiers had a severe form of diarrhea, more specifically known as cochin-china diarrhea (2). The infective larvae infects human by penetrating into the skin (1). *S. stercoralis* has a unique life cycle, capable of surviving in a human host for several years. It can cause autoinfection which may lead to chronic diseases (3). The complex life cycle of parthenogenetic female *S. stercoralis* enables it to reproduce without participation of a male (4). Most infections are asymptomatic; however, as these infections disseminate, hyper-infection may occur in immune-compromised and immune-deficient individuals, which may result in a fatal disease (3). There are several techniques for detecting larvae in stool samples, one of which is direct smear of feces in saline-lugol's iodine stain, formalin-ethyl acetate concentration, Harada-Mori filter paper culture, Bearmann concentration, and nutrient agar plate culture (4).

2. **Objectives**

Strongyloidiasis is endemic in Iran with prevalence of 0.3% in general population, similar to several other countries (5). The aim of this study was to determine the epidemiological status of *S. stercoralis* by applying a comparative diagnostic approach in Lorestan Province, west of Iran.

3. **Materials and Methods**

A cross-sectional study was conducted in May 2011 and completed in March 2012 in the Lorestan Province, west of Iran. The population sample was chosen by randomized cluster sampling from the normal population, covered by all health centers affiliated with the Lorestan University of Medical Sciences. A questionnaire coupled with an interview were used to collect information about
and hygiene facilities. The two cases did not demonstrate
fection for local and nonlocal tourists, and a nine-year-old

two cases were observed: a 26-year-old man from a small

be attributed to factors such as climate, geographical

12% (6), and in Iran 0.03% (5). These differences appear to

r, and formalin-ether concentration techniques. Using

utrient agar plate culture, the stool specimens were

incubated for at least two days. Data were analyzed us-

ing SPSS software (SPSS Inc., Chicago, USA).

4. Results

The infection percentage of S. stercoralis in this study

minute (0.07%). From 2839 examined people, only

S. stercoralis in Iran was 0.03%, one

of the studies conducted on mentally-retarded children in

in southern and hot area of Bandar Abbas reported

31.6% (7). Mental retardation coupled with poor hygiene, enhance the risk

of being affected by intestinal parasitic infections (3).

stable temperature and transferred to the laboratory. Specimens were examined with light microscope using
direct fecal smear in normal saline-lugol’s iodine stain and formalin-ether concentration techniques. Using

utrient agar plate culture, the stool specimens were incubated for at least two days. Data were analyzed using

SPSS software (SPSS Inc., Chicago, USA).

2

2

4. Results

The infection percentage of S. stercoralis in this study

minute (0.07%). From 2839 examined people, only
two cases were observed: a 26-year-old man from a small
touristic town in Lorestan, a summer-holiday destination

for local and nonlocal tourists, and a nine-year-old

boy from rural areas of Lorestan with inadequate health

and hygiene facilities. The two cases did not demonstrate clinical symptoms.

5. Discussion

In the current study, using the nutrient agar plate cul-
ture method, S. stercoralis was detected in two cases. In

contrast, examining the direct fecal smear as well as for-

malin-ether concentration yielded no result. The preva-

lence degrees of S. stercoralis vary in different parts of

the world: in the province of Yunnan, China, it is 11.7%;
in Okinawa of Japan 9.6%; in Chiang Mai of Thailand, 47.6%; in Khammouane of Laos 23.8%; in Maceio of Brazil

12% (6), and in Iran 0.03% (5). These differences appear to

be attributed to factors such as climate, geographical

conditions, socioeconomic characteristics, and the de-

gree of improvements in hygiene and health. While the

overall prevalence of S. stercoralis in Iran was 0.03%, one

of the studies conducted on mentally-retarded children in

the southern and hot area of Bandar Abbas reported

17.31% (3). Similarly, another study on mentally-retarded

children in Tehran reported it as 31.6% (7). Mental retar-

dation coupled with poor hygiene, enhance the risk of

being affected by intestinal parasitic infections (3).

Sayyari et al. (8) observed that there was no case of S.

stercoralis in Iran. In this study, only formalin-ether con-

centration diagnosis method was used, which might

explain the results. Agar plate culture is more accurate

than direct smear. A research indicated that the accu-

racy of agar plate culture method was 4.4 times greater

than direct smear (9). Despite being a time-consuming

and long process, it is more sensitive and accurate for

finding larvae in feces (10). In another study for deter-


mining the efficacy of stool examination for detection

of Strongyloides infection, 1350 samples were collected

from Japan, Brazil and Thailand and examined by four

different methods: direct fecal smear, Harada-Mori fil-
ter paper, formalin-ether concentration, and agar plate
culture. The agar plate culture method showed significan-
tly better results compared to the others (11).

Researchers have mentioned that examination of du-

denal aspirate is very sensitive and invasive; however, it

is recommended to promptly show the presence of para-
sites in immunocompromised children with possible

severe infection (1, 12). Helminthes are the conduits of

soil-transmitted infections and a major health problem.

Their most prevalent strains are Ascaris lumbricoides, 

Trichuris trichura, and the hook worms (13); while their

most neglected one is S. stercoralis (3).

Generally, strongyloidiasis is considered a tropical dis-
ease; however, it is recommended that the Iranian physi-
cians and healthcare providers pay more attention by ask-
ing the laboratories to provide them with stool test results,

using the nutrient agar plate culture method and serologi-
testing. Furthermore, it is recommended that physi-
cians, in noticing gastrointestinal symptoms, or prior to

chemotherapy or steroid therapy, ask for results of a stool
test based on nutrient agar plate culture method.

Acknowledgements

The authors thank the Vice-Chancellor for Health and

health centers affiliated to Lorestan University of Medi-
cal Sciences. We also thank Dr. M. H. Eftekhari for his

kind assistance.

Authors’ Contributions

Study concept, design and laboratory work: Ebrahim

Badparva; analysis and interpretation of data and draft-
ing of the manuscript: Hassan Nayebzadeh; collection of

the specimens: Malek Hossein Barkhordari and Beh-

rooz Ezzatpour.

Financial Disclosure

The authors declared no conflict of interests.

Funding/Support

This research was financially supported by the Vice Chan-
cellor for Research, Lorestan University of Medical Sciences.

References

1. Lim S, Katz K, Krajden S, Fukuta M, Keystone JS, Kain KC. Complicat-
ed and fatal Strongyloides infection in Canadians: risk factors,


3. Shokri A, Sarassabi KS, Teshnizi SH, Mahmodi H. Prevalence of

Strongyloides stercoralis and other intestinal parasitic infec-
tions among mentally retarded residents in central institution of


4. Siddiqui AA, Berk SL. Diagnosis of Strongyloides stercoralis infec-