STUDIES ON INTESTINAL HELMINTHIASIS IN THE SOUTH OF IRAN

I. The Bandar Abbas and Minab Areas*

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ABSTRACT **The prevalences of various intestinal helminthiasis have been determined by the examination of 3109 inhabitants of 20 villages located in the mountainous and coastal regions of the Bandar Abbas and Minab areas in southern Iran.**

A portion of people infected with each parasite were treated with the appropriate drug and the worms expelled were collected, identified and counted.

The results indicate that the prevalence of most helminthiasis is rather low in all areas except for hookworm, which was as high as 65 % in the coastal area of Minab, Trichostrongylus spp. which had a prevalence of 33.2% and 41% in the coastal and mountainous areas of Minab, and *H. nana* which had a prevalence higher than

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20% in most villages.

The mass-tteatment of cases indicated that 89% of the inhabitants are infected with E. *vermicularis.*

Ninety-seven percent of the hookworms found were *Ancylostoma doudenale* **with a mean worm burden of 20.2, the species of Trichostrongylus found were** *T. Problurus, T. colubriformis, T. vitrinus and T. axei.*

About 6% of the infected cases in the Bandar Abbas and 30% in the Minab areas had mixed infection (with two or more parasites).

The prevalences of the infections found in These two areas are compared with results obtained from surveys in other parts of the country.

INTRODUCTION

Although the public health importance of various human helminthiases in Iran has already been established (Arfaa and Mahdavi, 1969; Arfaa, 1972), information on the prevalence and intensity of different helminthiasis has not yet been collected from all parts of the country. Studies on the prevalence of helminthiasis undertaken by Sahab *et al.* (1967[a] and 1967[b]) in Khuzestan, southwest Iran, have indicated the high prevalence of this infection among the population of this area.

In the present paper, the results of a survey on intestinal helminthiases carried out in rural areas of Bandar Abbas and Minab are presented. The results of studies in the Kazeroun and Bushehr areas will follow.

MATERIAL AND METHODS

To find the prevalence of various intestinal helminthiasis in these areas, stool samples from a total of 3109 inhabitants of various age and sex groups from 20 villages located in the mountainous and plain areas of Bandar Abbas and Minab were examined using the Willis flotation method. The Stoll method was also used for indicating the intensity of hookworm infection.

Of 20 villages surveyed, 4 were located in the mountainous and 4 in the coastal areas of Bandar Abbas, while in the Minab area, 9 villages were situated in the coastal area along a river and 3 in the mountains (see map).

A portion of the people infected with each helminth parasite was treated with the appropriate drugs. The worms expelled were collected, identified and counted to find the species and worm burden of each parasite.

RESULTS

1. *Prevalence of infection* :

The number of persons examined in each geographical division and the prevalence of infection with each intestinal helminth are shown in Table 1.

TABLE - 1

Number of persons examined and prevalence of various intestinal heliminthiasis in 20 villages of Bandar Abbas and Minab

Areas		No. Examined	Percent found infected with:						
			A.l.	Tr.	T.t.	Hook-worm	S.s.	H. nana	T.s.
Bandar Abbas	Mountain	740	1.3	1.0	1.3	0.2	0.2	25.0	0.1
	Coast	734	2.1	7.0	1.9	5.4	0.2	26.7	0.
Minab	Mountain	770	2.5	41.0	1.4	2.5	0.4	14.0	0.7
	Coast	865	1.8	33.2	4.1	65.4	3.0	23.0	0.1

A.l. = *Ascaris lumbricoides*
Tr. = Trichostrongylus spp.
T.t. = *Trichuris trichiura*
T.s. = *Taenia saginata*
S.s. = *Strongyloides stercoralis*

Tables 2 and 3 indicate the prevalence of infection in various sex groups and Table 4 in different age groups.

These results indicate that the prevalence of infection with most helminths is low in most areas except for Trichostrongylus species, which is prevalent in both the mountainous and the coastal areas of Minab, and hookworm, which is found with a high rate of infection in the coastal area of Minab. *Hymenolepis nana* was also found with a moderate prevalence in most of the villages visited. The rates of infection differ slightly according to the sex of the inhabitants of various areas, except in the case of Trichostrongylus species which has a higher prevalence among females than among males.

A statistical analysis of the data collected (x^2 test) showed that the difference in the prevalence of Trichostrongylus infection among males and females in the Minab area is statistically significant with a $P < 0.01$.

TABLE 2

Number of persons examined and prevalence of various intestinal helminthiasis according to sex in 8 villages near Bandar Abbas (Winter, 1972)

Topographic Division	Sex	No. Examined	Percent Positive With:					
			A.l.	Tr.	T.t.	Hook-worm	H. nana	S.s.
Mountainous Area	M	384	0.5	0.5	1.0	0.5	25.5	0.5
	F	356	2.2	1.6	1.6	0.	24.7	0.
	T	740	1.3	1.	1.3	0.2	25.0	0.2
Coastal Area	M	398	2.5	4.5	4.0	6.0	20.0	0.5
	F	336	1.7	10.	1.7	4.7	34.5	0.
	T	734	2.1	7.0	1.9	5.4	26.7	0.2
TOTAL	M	782	1.5	2.5	1.5	3.3	22.7	0.5
	F	692	2.3	6.7	2.0	2.7	34.4	0.
	T	1474	1.8	4.3	1.7	3.0	27.8	0.2

The prevalence of *Enterobius vermicularis* was indicated by the mass-chemotherapy of 100 persons from villages of the coastal area of Minab using Pyrantel Pamoate, and 89% of the people were found infected with this parasite. It is interesting to note that the rate of infection with this parasite did not differ significantly among the various age groups; the minimum (80%) was found in age group 30-39 and the maximum (100%) in age group under 9. The prevvelence of infection with *T. Soginata,* indicated by finding the eggs of the parasite in the stool, was between 0 and 0.7.

2. *Intensity of various helminthiasis*

Treatment of patients infected with various helminths and collection and counting of the number of worms expelled up to 48 hours after treatment indicated the following:

For Trichostrongylus spp., the treatment of 25 infected persons from the coastal areas of Minab and Bandar Abbas,

TABLE 3

Prevalence of intestinal helminthiasis according to sex in two topographical divisions of Minab (Winter, 1972)

Topographic Division	Sex	No. Examined	Percent Positive With:					
			A.l.	Tr.	T.t.	Hook-worm	H. nana	S.s.
Mountainous Area	M	424	3.0	31.8	1.0	3.0	14.0	0.4
	F	346	2.0	52.6	1.7	2.0	16.4	0.2
	T	770	2.5	41.0	1.4	2.5	15.0	0.3
Coastal Area	M	518	1.7	28.9	4.8	65.8	25.4	3.6
	F	347	1.4	39.7	3.0	64.8	19.5	2.0
	T	865	1.6	33.2	4.1	65.4	23.0	3.0
TOTAL	M	942	2.5	30.2	3.0	37.5	20.3	2.2
	F	693	1.7	46.0	2.4	33.4	18.0	1.1
	T	1635	2.2	37.0	2.8	35.8	19.3	1.7

using Bephenium Hydroxynaphtoate, resulted in the expelling of 769 worms (598 females and 171 males), indicating a mean worm load of 35.2 per person with a range of 8 to 126.

The number of worms collected from 25 persons treated in the mountainous areas was 3703 (2748 females and 955 males), indicating a mean worm load of 149.7 per person with a range of 22 to 1069.

The treatment of 100 persons from the coastal area of Minab, who were infected with hookworm and treated with Pyrantel pamoate (20 mg/kg), resulted in the expelling of 2025 worms (1313 females and 712 males). The maximum number of worms collected from one person was 139, the minimum 2 and the mean 20.2.

The results of egg count among people infected with hookworm using the Stoll method (4 times for each specimen) showed that the mean number of eggs/gram of faeces was 1250 in infected persons, with a minimum of 50 and a maximum of 13,000 eggs/gram of faeces for each person.

TABLE 4

prevalence of various intestinal helminthiasis found in different age groups examined in Bandar Abbas and Minab areas (Winter, 1972)

Age Group	Bandar Abbas						Minab					
	No. Exam.	Percent Infected With:					No. Exam.	Percent Infected With:				
		A.l.	Tr.	T.t.	Hook-worm	H. nana		A.l.	Tr.	T.t.	Hook-worm	H. nana
0-4	240	1.6	1.6	---	0.8	30.8	190	3.1	21.0	2.1	22.6	25.8
5-9	322	1.8	1.2	0.6	4.3	35.4	496	2.0	30.8	3.4	43.3	28.6
10-14	316	1.2	8.3	1.8	3.7	25.9	676	2.5	37.3	3.9	38.0	26.0
15-19	78	0.	2.5	2.5	0.	30.7	90	1.0	50.0	2.0	34.4	14.4
20-39	272	2.9	4.4	3.6	2.9	22.0	325	2.4	42.7	1.5	33.8	7.6
40-59	196	2.0	6.1	2.0	3.0	13.2	209	1.4	49.2	1.9	33.4	5.7
60 +	50	0.	0.	0.	0.	0.	49	2.0	44.8	8.0	24.0	10.0
TOTAL	1474	1.7	4.0	1.6	2.8	25.9	1635	2.2	37.0	2.8	35.8	19.3

Concerning Enterobiasis, a total of 5731 worms (4606 females and 1125 males) were collected from 100 treated cases. The maximum number of worms collected was 625, the minimum 3 and the mean 57.3 per person.

3. *Species of worms*:

The species of Trichostrongylus found after the treatment of infected persons from the coastal areas were, in the order of the number collected, *T. probolurus*, *T. colubriformis* and *T. orientalis*; in the mountain areas the species found were *T. colubriformis*, *T. probolurus*, *T. orientalis*, *T. vitrinus* and *T. axei*.

Of 100 persons treated for hookworm, 97 had *Ancylostoma duodenale* and 3 had both species of *A. duodenale* and *Necator americanus*.

4. *Mixed infections*:

Of 1474 persons examined in the Bandar Abbas area, 502 (34%) were found infected with one species, 78 (5.2%) with 2 species and 2(0.1%) with 3 species of helminths. Of 1635 persons examined in the Minab area, 687 (42.1%) were found infected with one species, 393 (24%) with 2 species, 85 (5.1%) with 3 species and 12 (0.7%) with 4 species of helminths.

DISCUSSION AND CONCLUSION

In the areas surveyed, infection with intestinal helminthiases, especially Ascaris, is very low in comparison with other parts of the country (Sahba *et al.*, 1967; Sabbaghian *et al.*, 1970; Mobedi *et al.*, 1971; Arfaa, 1972). Infection with *H. nana* is an exception. The rate of infection with this parasite was found to be rather high in most areas.

The high prevalence of hookworm infection in the coastal area of Minab might be due to the ecological condition of the area, i.e. high humidity due to the abundance of palm and citrus trees. On the other hand, the high rate of infection with Trichostrongylus spp. in the Minab area might be due to the abundance of livestock and their close contact with man. A proof of this hypothesis is the predominance of animal species of Trichostrongylus (*T. colubriformis* and *T. Probolurus*) among man in the above-mentioned area. It should be noted that, in addition to the above-mentioned intestinal helminths found in man during the present study, a few cases of infection with *H. diminuta* among the population of several villages in the same

areas have previously been reported (Ghadirian and Arfaa, 1972).

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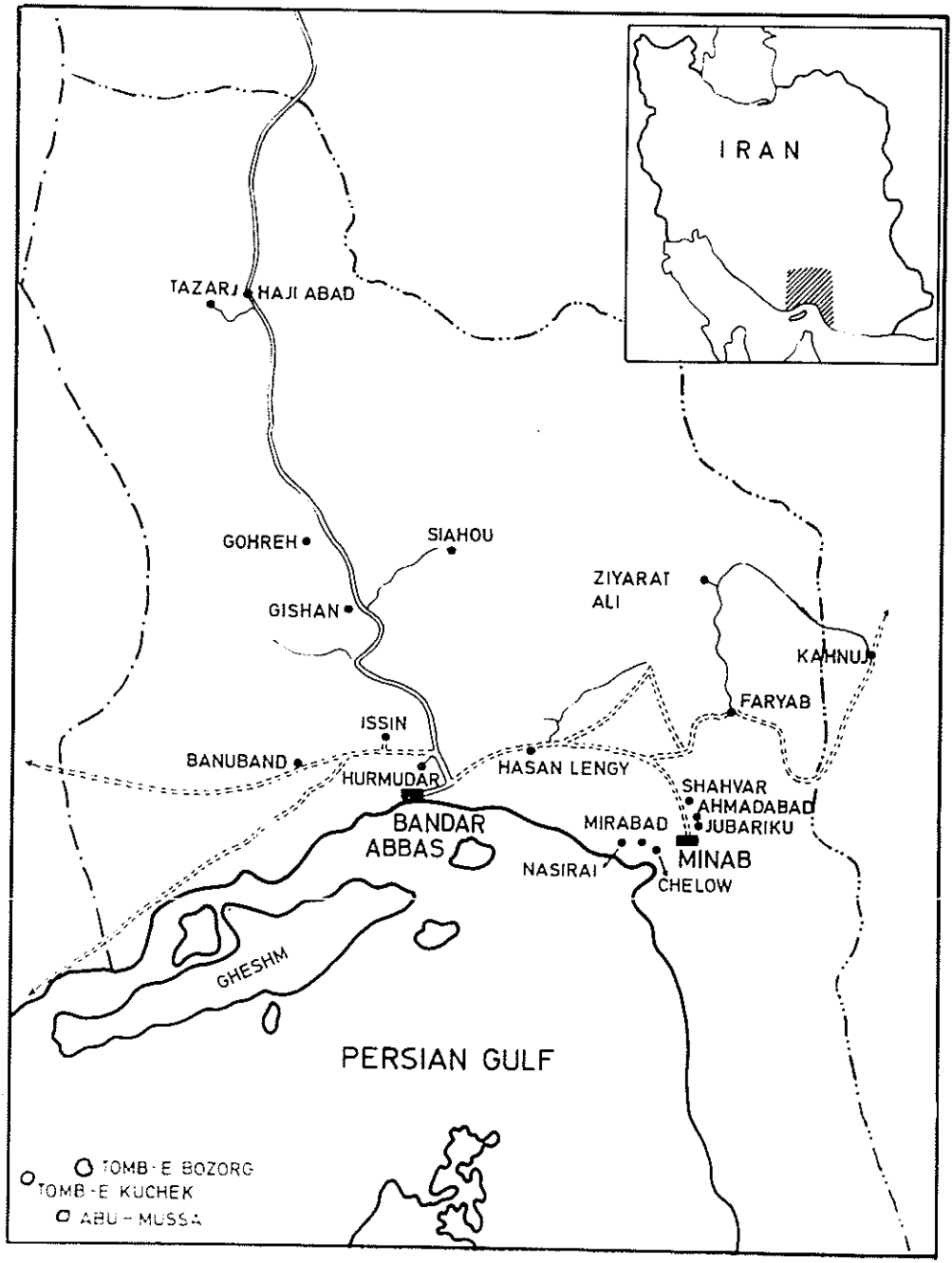
VILLAGES SURVEYED FOR INTESTINAL HELMINTHIASIS IN BANDAR ABBASS AND MINAB AREAS, SOUTHERN IRAN (1972)



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