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THE EFFICIENCY OF A MALARIA SCREENING PROGRAM AMONG AFGHAN REFUGEES IN KERMAN, ISLAMIC REPUBLIC OF IRAN

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ABSTRACT

Evaluation of a malaria screening program was carried out in two screened Afghan refugee camps in Bardsir and Rafsanjan and compared to non-screened Afghan refugees within Kerman, as well as refugees with malaria diagnosed by Communicable Disease Control (CDC) Laboratories in Kerman and Rafsanjan, by parasitological blood examinations. The study involved 456 residents of two refugee camps and random samples of 512 refugees in the Kerman Bus Terminal and 1300 persons referred to Kerman and Rafsanjan CDC laboratories, aged from 1 to 70 years.

Malaria was found in 403 (17.8%) of the persons examined. *Plasmodium vivax* was identified in 85.1%, *Plasmodium falciparum* in 13.6% and mixed infection due to both of these species was found in 1.3% of the cases. The prevalence of parasitemia in screened camps was 4 times lower than non-screened active cases detected.

A comparison of age-specific rates of malaria in screened and non-screened Afghan refugees indicated that screening programs are highly effective. The Afghan refugees bring high infection loads with them from outside and cause an out break of the infection, particularly in areas of Iran where malaria is under control. Therefore, malaria control in Afghan refugees in Iran should be primarily based on curative as well as preventive measures.

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Keywords: Malaria, screening, Afghan refugees, Iran.

INTRODUCTION

Malaria is considered to practically he the most serious tropical disease in all affected countries and represents a major ohstacle to the socio-economic development of many of them.

Malaria in Iran has always been a serious problem, affecting the health and economy of the inhahitants of malarious areas, and obstructing the development of these areas by reducing the efficiency of the work force and causing absenteeism in school children.

During the last decades, the malaria situation in Iran has been deteriorating. Afghan refugee movements within the country as well as across the borders, social problems, and difficult access to some areas, resistance of mosquitoes to insecticides, drug resistance in the parasite which have been introduced by immigrants coming from neighbouring countries, and rapid population growth are among the principal factors that have resulted in a worsening of the malaria situation in Iran in recent years.

In addition to problems caused by imposed war, Afghan

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TABLE I. The study population

	Male		Female		Total	
	No	%	No	%	No	%
Bardsir camp	123	51.3	117	48.7	240	100.0
Rafsanjan camp	106	49.1	110	50.9	216	100.0
Kerman's Bus Terminal	512	100.0	-	-	512	100.0
Referrals to Kerman CDC laboratory	841	90.2	91	9.8	932	100.0
Referrals to Rafsanjan CDC laboratory	338	91.8	30	8.2	368	100.0
Total	1920	84.7	348	15.3	2268	100.0

TABLE II: Comparison of malaria prevalence in screened and non-screened Afghan refugees in Kerman, 1992.

	Number examined	Number positive	Percent positive
Screened Afghan refugees:			
Bardsir camp	240	2	0.8
Rafsanjan camp	216	-	-
Total	456	2	0.4
Non-screened Afghan refugees:			
Kerman Bus Terminal	512	8	1.6
Referrals to Kerman CDC laboratory	932	184	19.7
Referrals to Rafsanjan CDC laboratory	368	209	56.8
Total	1812	401	22.1

refugees have brought a heavy load of malaria infections with them from Afghanistan and Pakistan, causing introduction of the infection, particularly to areas where malaria is under control.[4,6] About 1500 to 7600 malaria cases are imported annually from east and south-east neighbouring countries.[7] For these reasons, the Malaria Control Division has set up an intensive malaria control programme at the borders and refugee camps to screen all Afghan refugees entering the country.

It is important to know how refugees have affected the epidemiology of malaria and the malaria control program and more specifically how their presence has influenced the selection of appropriate control measures. This information may be of great assistance when establishing malaria control measures, or approaching the eradication of malaria in this country.

The purpose of this report is to evaluate the efficiency of this screening program by comparing malaria prevalence between screened refugees in camps and non-screened refugees in Kerman and Rafsanjan cities.

SUBJECTS AND METHODS

Comparative data on age-gender specific prevalence of malaria in screened and non-screened Afghan refugees were obtained by a cross-sectional sample survey in the Afghan refugee camps of Bardsir and Rafsanjan and a random sample of Afghan refugees in Kerman and refugees with malaria diagnosed by Communicable Disease Control (CDC) laboratories in Kerman and Rafsanjan from March 21 to August21, 1992. Secondary data from CDC laboratories of Kerman and Rafsanjan were used for comparison of malaria with screened Afghan refugees. Period prevalence

TABLE III: Comparison of age-specific prevalence of malaria (*P. vivax, P. falciparum* and mixed infections of these two species) in screened and non-screened Afghan refugees in Kerman, 1992.

Age (year)	Screened Afghan refugees			Non-screened Afghan refugees		
	Number examined	Number positive	Percent positive	Number examined	Number positive	Percent positive
1-9	143	1	0.7	24	9	37.5
10-19	97	-	-	269	58	21.6
20-29	71	-	-	925	232	25.1
30-39	59	-	-	398	77	19.3
40-49	41	1	2.4	134	19	14.2
50-59	17	-	-	42	5	11.9
60+	28	-	-	20	1	5.0
Total	456	2	0.4	1812	401	22.1

TABLE IV: Age and gender-specific prevalence of malaria in Afghan refugees in Kerman, 1992.

Age (year)	Male			Female		
	Number examined	Number positive	Percent positive	Number examined	Number positive	Percent positive
1-9	102	6	5.9	65	4	6.1
10-19	280	49	17.5	86	9	10.5
20-29	884	217	24.5	112	15	13.4
30-39	406	71	17.5	51	6	11.8
40-49	153	18	11.8	22	2	9.1
50-59	52	5	9.6	7	0	0.0
60+	43	1	2.3	5	0	0.0
Total	1920	367	19.1	348	36	10.3

estimates for the non-screened Afghan refugees referred to CDC laboratories are primarily based on passive case detection (where blood smears were obtained from suspected malaria cases visiting a health center or a hospital). Point estimates of malaria prevalence in the two screened and one non-screened population groups in Kerman are primarily based on active case finding (where malaria workers go into a camp or to the Kerman Bus Terminal and take blood smears from available Afghan refugees).

The samples selected were composed of 1920 men and 348 women between 1 to 70 years of age; 240 were examined in Bardsir, 216 in Rafsanjan, 512 in Kerman Bus Terminal, 932 persons referred to Kerman CDC laboratory and 368 to Rafsanjan CDC Laboratory (Table I).

Each person in the sample was classified according to age and gender and all persons were screened for the detection of malaria parasites by routine thick and thin blood film examinations. Blood smears were stained with Giemsa, following standard procedures. Microscopical examination was done by experienced technicians. A blood film was considered negative if no parasite was detected in at least 100 microscopic fields from a thick film.

RESULTS

Comparative data on the prevalence of malaria (*Plasmodium falciparum, P. vivax* and mixed infections of these two species) in screened and non-screened Afghan refugees are set out in Table II. Patent parasitemia was detected in 2 screened refugees from 456 examined and in 401 non-screened refugees from a sample of 1812. The overall crude prevalence of malaria in the two population groups (screened= 0.4%, non-screened= 22.1%) revealed that malaria was extremely more prevalent in the non-screened than in the screened population (X^2= 117.3; 1 df; P<0.0001). The relative prevalence of malaria was 22.1/0.4= 55.2. Since the prevalence estimates for Afghan refugees referred to CDC laboratories are exclusively based on passive case detection, thus the prevalence data in the two

population groups are not exactly comparable. Thus, a comparison has been made between the prevalence of parasitemia detected in Kerman Bus Terminal non-screened active cases and screened refugees. The relative prevalence of malaria was 1.6/0.4= 4. Although the prevalence of parasitemia was 4 times higher in non-screened refugees, it was not statistically significant, probably due to a small number of cases (non-screened= 8/512×100= 1.6, screened= 2/456×100= 0.4; X^2= 2.96, 1 df, P<0.1). Overall, Rafsanjan CDC laboratory had a greater slide positive rate than Kerman CDC laboratory, 56.8% versus 19.7% (X^2= 83.1, 1 df, P<0.001).

Overall, malaria was found in 403 (17.8%) of the persons examined. 343(85.1%) had *P. vivax*, 55(13.6%) had *P. falciparum* and 5(1.3%) were infected with both of these Plasmodium species. *P. vivax* was the dominant malaria parasite, being found in 343/2268 or 15.1% of blood films.

Table III shows the age-specific prevalence of malaria in screened and non-screened Afghan refugees. The prevalence of malaria in non-screened Afghan refugees decreases with an increase in age.

Table IV indicates the relationship of age and gender to the prevalence of malaria in Afghan refugees. Of total number examined, 1920 (84.6%) were male and 348(15.3%) were female. Females exhibited a lower prevalence of malaria in all age groups except the 1-9 year age group. The overall prevalence of positive blood films was significantly higher in males than females with a male to female relative prevalence of 19.1/10.3= 1.8 (M= 367/1920×100= 19.1, F= 36/348×100= 10.3, X^2= 15.5, 1 df, P<0.001). Males have approximately twice the overall prevalence rate of females. Table IV also shows that the prevalence of malaria increases with age in both genders up to 30 years of age but later decreases with advancing age.

DISCUSSION

Malaria endemicity in Iran varies markedly from one zone to another. Few temporary foci exist in the coastal area of the Caspian sea and the central plateau. Transmission usually occurs in the southern part of the Zagros mountains; in the west and south-west, the situation is under control; however, in the south-east (Sistan and Baluchistan, Hormozgan, and the tropical part of Kerman province) transmission is high, in particular in the district of Bandar Abbas, Minab, Iranshahr, Chahbahar and Kahnuj.[8,9]

About 3 million Afghans have migrated to Iran since 1979, which is nearly one-fifth of Afghanistan's population (personal communication with Bureau of Alliance, Foreigners and Immigrants Affairs, Kerman Province). A mass influx of refugees began in 1979 as a result of the Russian invasion of Afghanistan. Some of the refugees are lodged in camps all over the country. There are two camps in Kerman Province; one in Bardsir and another in Rafsanjan. Thus registered refugees are free to come and go from camps, find employments, travel across the country, and operate a variety of businesses.

Malaria as an imported infection may present with atypical features. The purpose of the present study was to examine the efficiency of a malaria control program at borders and refugee camps for Afghans migrated to Iran.

The higher prevalence of malaria in non-screened compared to screened Afghan refugees proves that the refugees entering Iran carry a considerable number of malaria parasite infections with them. The massive influx of refugees occurring since 1980 has caused the relative rise in prevalence of malaria after that in Iran. Malaria was less prevalent in Afghans screened in contrast to non-screened ones. The point prevalence of parasitemia in screened camps was only 0.8% in Bardsir and was zero in Rafsanjan camp, whilst 1.6% was recorded for non-screened refugees in Kerman. The major reason for the very low prevalence of malaria in Bardsir camp and there being no case in Rafsanjan camp was attributed to the intense screening program in these two camps. Factors that could possibly account for the high malaria rate in Afghan refugees are parasitic recrudescence and relapse of disease.[10] Higher malaria rates in Afghan refugees are also reported to be due to endemic areas from which they come and disease prevalence in areas where they are accommodated.[11]

Immunity against malaria increases with age as a result of repeated infections in endemic areas; as it is partial and short-term, older age groups in a persistently endemic area exhibit low levels of parasitemia.[12] In this study, the prevalence of malaria decreased with increasing age (above age 30)- a manifestation of a high level of immunity in the older age groups. Thus a high parasite rate in younger age groups accompanied by a low prevalence in older age groups, as seen in this study, indicates high malaria transmission in the Afghan refugee population.

The prevalence of malaria was higher in males than females. This is because of males professions and their consequent travellings to the contaminated areas. These findings have been supported by others.[13,14]

The conclusion that Afghan refugees bring a high infection load with them from Afghanistan (or on their way from Pakistan), indicates that besides preventive measures, curative measures must be the mainstay of malaria control strategy in Afghan refugees in Iran. Therefore, constant monitoring of malaria infection in Afghan refugees and their treatment are recommended.

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