

Epidemiological Features of Malaria in Qom Province from 2001 to 2011

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Abstract

Background: Malaria is still one of the most serious health problems all across the world. This study aimed at investigating the epidemiological features of malaria in Qom province from 2001 to 2011.

Materials and Methods: It was a descriptive-analytic cross-sectional study conducted on the malaria cases in Qom province from 2001 to 2011. The data analyzed by SPSS software and *t*-test and chi-square test.

Results: During those 10 years, 553 cases of malaria were reported. Most of those cases were Iranian men of 15 years old and over. In most of the cases, *Plasmodium vivax* was the main cause of the disease.

Conclusion: Considering the huge number of pilgrims entering Qom city and also the existence of Mosquito vectors, programs to combat malaria should continue.

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Introduction

Currently, malaria is one of the most important health problems in many parts of the world including developing countries in sub-Saharan Africa. The disease is endemic to 106 countries and in addition to high mortality rate, it causes anemia and debility that wastes work-force and consequently has an adverse effect on the social, economic and agricultural conditions of the inflicted countries [1]. In the Eastern Mediterranean region, more than 7.5 million cases of malaria were reported in 2009 [2]. Malaria is one of the endemic diseases to Iran too and no another disease like malaria has caused such huge life, social and economic losses in the country over the past years [3]. Despite five decades of efforts to control malaria, cases of the disease are annually reported in the country (3031 cases in 2010) [4, 5]. This disease is considered as one of the re-emerging diseases of the country and even in northern and west north parts of the country which were considered clean epidemiologically, it has been reactivated in some foci during last decades [6]. The commonest way for malaria to transmit is through the bite of Anopheles mosquitoes. Heavy traffic of foreign subjects who are mostly refugees from Afghanistan and Pakistan in the central provinces (e.g. Qom) has created serious health problems such as lack of control over diseases like malaria and tuberculosis. Since epidemiological studies are of great value in proper planning to control malaria,

this study was conducted to determine the epidemiological features of the malaria in Qom province.

Materials and Methods

It was a descriptive-analytic cross-sectional study conducted on 539 patients suffering from malaria. The required data were gathered through records and filled-out forms (containing the summary of malaria epidemiological information) available in specialized center to tackle malaria, private and public health-care centers and hospitals in Qom province from 2001 to 2011. There was also a questionnaire to gather information including date of morbidity, age, nationality, gender, occupation, place of resident, duration of the symptoms, the diagnosing center, type of parasite, previous history of infection by malaria and history of travelling to the infected areas. The resulting data were categorized and after determining the statistical indices like API (Annual Parasite Incidence) and other epidemiological indices used for malaria, the chi-square or Fisher's exact tests were applied to analyze the data. All analyses were performed by SPSS software (version 16). Levels of *p*-value equaled to or less than 0.05 considered as significant. Helsinki ethical principles were carefully observed in all stages of the study and thus all information on patients was confidential.

Results

The summary of the results is shown in table 1 and figure 1. During the study 539 patients with malaria were reported in Qom province. Of these patients 63.5% were male and 36.5% female. Number of patients in age groups of 0-4, 5-15, and over fifteen-years-old were 63 (11.7%), 119 (22.1%) and 357 (66.2%) respectively. Annual Parasite Incidence (API) in the province ranged from 0.011 to 0.16 (in thousand persons) from 2001 to 2011. Based on data recorded, 0.5% of the infections were of local transmission and 99.5% were imported infections. Most of the patients were non-Iranian (91.5%) and among these afghans had the highest rate of infection (49.5%). Next were Pakistanis by 25.5% and other nationalities like Yemenis, Sudanese and Indians etc. ranked last (16.5%). However, most patients reported in 1390 were of Pakistani nationality. Also, urban residents were more afflicted by malaria. Concerning the type of the parasite,

our study revealed that 502 cases (93.2%) were infected by *Plasmodium vivax*, 35 cases (6.5%) by *Plasmodium falciparum* and 2 patients (0.5%) by mix infection. Fifty eight percent of cases were infected from 2001 to 2003. This study showed that the diagnosing centers of the disease were mostly the public health-care centers and hospitals (92.5%) and only 7.5 percent of the cases diagnosed by private clinics.

Discussion

During the past 10 years more than half of the total cases of malaria in Qom province occurred between 2001 and 2003. This might have been caused by the rather heavy rainfall in July and August in the mentioned years which allowed for the formation of larval habitats in endemic areas of the disease (According to figures of the Bureau of Meteorology). Also, the sharp increase of disease in neighboring countries like Afghanistan and Pakistan

Table1. Frequency of parasite and epidemiological indices of malaria in Qom province, 2001-2011

Year	At risk population	API	ASPR	ABER	Vivax/falciparum	Species			Prepared slides		Case detected	
						vivax	falciparum	mix	Active	Passive	Active	Passive
2001	917080	16.1	15.5	0.10	1.34	149	2	0	356	616	9	142
2002	942045	0.12	14	0.08	17.5	97	17	0	321	494	12	102
2003	967193	0.052	6.9	0.076	13.3	45	6	0	289	452	6	45
2004	991993	0.057	8.6	0.066	-	57	0	0	258	403	5	52
2005	1018997	0.021	9.4	0.022	-	22	0	0	31	202	2	20
2006	1046737	0.018	3.8	0.047	0	19	0	0	183	317	3	14
2007	1074475	0.011	3	0.037	20	10	2	0	102	302	2	10
2008	1102948	0.02	16.9	0.011	4.7	21	1	0	41	89	6	16
2009	1106041	0.015	9.2	0.016	0	16	0	1	104	79	2	15
2010	1129288	0.021	16.1	0.013	20	20	4	0	75	74	3	21
2011	1154268	0.043	47.6	0.009	6.5	46	3	1	39	66	17	33
Total						502	35	2	1799	3094	67	470

API = Annual Parasite Incidence, ASPR = Annual Slide Positive Rate, ABER = Annual Blood Examination Rate

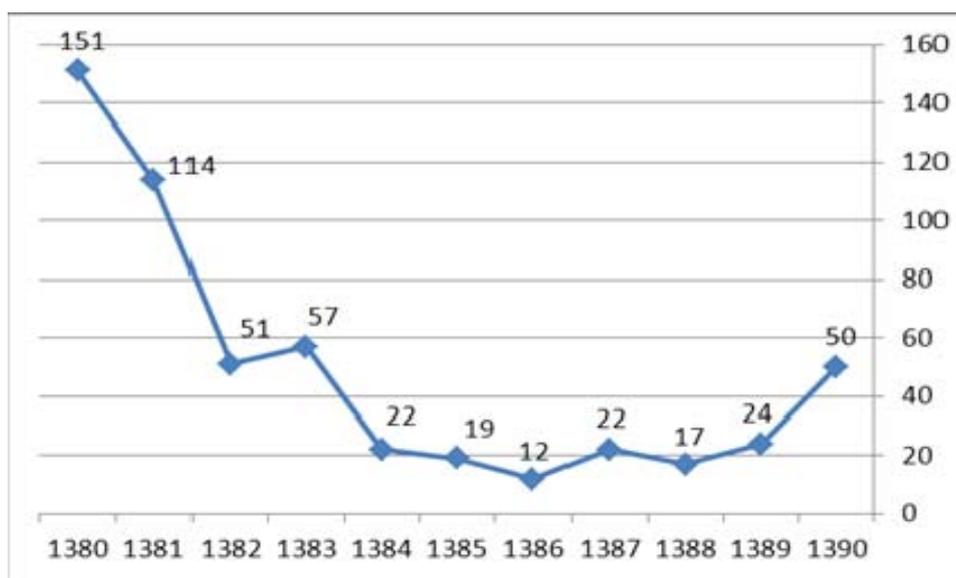


Figure1. Comparative frequency of malaria in Qom province, 2001-2011

could add to the problem. From 2001 to 2007 the positive cases had a gradual drop but from 2008 and 2010 there was relatively no change (Fig.1). Of the possible reasons for this decline could be existence of effective health care systems in endemic areas and also improved weather conditions in the Iran's eastern neighbors. But, against expectations, the number of reported cases in 2011 compared to the past 6 years has had an unexpected increase.

The trend of malaria infection in Qom (during that 10 years) has had a lot of similarities with the reports of the country's other medical universities [7]. According to figures of the Iran's Center for Disease Control, more cases have always been found among men in recent years. From 2002 to 2007 the shares of male cases (of total cases) were 74.5, 68.5, 71.5, 65.5, 62.5 and 62.2 respectively [8]. In other parts of the country like Larestan (77% males), Mazandaran (88.4% males) and Hamadan (80.6%) gender distribution of the patients has been the same [9, 10, 11]. In our study, people of 15 years old and over had the highest rate of malaria among other age groups. Such pattern is also reported for whole country. According to Iran's Center for Disease Control, in 2007 sixty percent of the cases belonged to people of 15 years old and older, 30% to 5-15 years old age group and 9.5% to 0-4 years old. The findings are also in line with the results obtained in Bandar Abbas, Rafsanjan, Isfahan and Mazandaran [10, 12, 13, 14]. Most patients recorded in our study (93.2% cases) were infected by *plasmodium vivax* and this is consistent with country's profile [8]. Only 0.5% of the cases were locally transmitted cases and the rest were imported infections. Comprehensive Malaria Control Program of Iran divides the country into 4 strata in which Qom province is located in the second stratum (an area with high imported cases and concurrently potential to local transmission) [7]. In present study, patients with Afghan nationality had the highest rate of infection (49.5%). This matter is in line with the findings of our study. Provinces such as Isfahan, Mazandaran, Ardebil and Qom Province make up the second stratum. Most diagnosed patients in these provinces are imported and of non-Iranian nationalities. In a study that was conducted in Isfahan from 2004 to 2009, 91% of cases were Afghans and 5.6% were from other countries [13]. In another study in Mazandaran, Najafi et al. found that 80.3% of the patients were Afghans [10].

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Our study showed that 73% of the cases were city-dwellers. This finding is inconsistent with results of studies in endemic areas of country namely Bandar Abbas [14]. This difference might be due to the fact that most of the reported cases in second stratum are foreigners and these cases usually tend to dwell in urban areas of the target province, but in provinces located in the first stratum (like Isfahan) higher rates of infection is expected to occur in rural areas in which less preventive facilities and personal protective equipments are available. It is necessary to note that during the last decade 83% of reported patients in country has been living in villages [15].

Considering the fact that Qom province is home to a lot of pilgrims from all over the globe especially countries like Afghanistan, Pakistan and African countries that are endemic to the malaria and also the geographical and climatic conditions of the Qom province and existence of Anopheles mosquitoes, potentiality of malaria transmission cycle re-establishment is extremely looming. Therefore, continuation of malaria control programs including disease reporting system, effective laboratory facilities, early and quick diagnosis and treatment of patients and, if necessary, vector control measures should be assured. It is recommended to provide adequate training for health workers involved in the control program so that when they notice clinical symptoms of malaria (like fever in the foreign subjects) no time is wasted in referring cases to malaria diagnosis centers.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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