

## Increasing Imported Malaria in Southwest Madrid, Spain

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**Abstract:** We report a continuous increase of imported malaria cases in a Madrid District, from 8 patients seen in year 1999 to 39 in year 2004, parallel to the rising of immigrant population from malarious areas along the past 6 years. We describe their epidemiological and parasitological characteristics. *Plasmodium falciparum* was the most frequent species observed, accounting for 68% of the cases. Most patients were immigrants recently settled in Spain who return after a visit to their countries of origin, mainly sub-Saharan countries.

**Key words:** Malaria, imported, immigration, *Plasmodium falciparum*

### INTRODUCTION

Despite great efforts made along past decades, malaria is still a major cause of morbidity and mortality in the tropics and a notable resurgence of imported cases is seen in temperate areas of the world where malaria was previously eradicated. For centuries, malaria was endemic in Spain and other European countries but disappeared by the mid 20th century. After 1964, when malaria was officially declared eradicated in Spain (Pletsch, 1965) only some imported cases from travelers had been observed in Madrid, mainly businessmen and tourists to tropical countries. This picture has changed during the past few years mostly due to the high number of immigrant workers or refugees just arrived from malarious areas, mainly Sub-Saharan countries (Jelinek *et al.*, 2002). The aim of this report is to stand out the increase of malaria cases along the 1999-2004 period in a southwest Madrid Health District and to describe the basic epidemiological and parasitological characteristics of cases seen.

### MATERIALS AND METHODS

A descriptive survey in a southwest Madrid Health District was prospectively carried out from 1999 to 2004 to analyze imported malaria cases detected among the immigrant population living in this area from three different sources: the Madrid Epidemiology Surveillance Service; the "Severo Ochoa" Hospital Application of the Minimum Data Set (MDS) and direct declarations of cases observed in the Microbiology Department of the

Hospital. All three sources were compared and duplicate cases were discarded. Epidemiologic features were recorded through an specific malaria questionnaire to patients, either in person or by telephone interview. Information on immigrant population registered in the census was provided by the Madrid Regional Office for Immigration (OFRIM).

The microbiological diagnosis of symptomatic patients seen in our hospital with a clinical suspect of malaria was established by fast screening with a commercial immunochromatography kit (Binax NOW ICT Malaria; Binax, Inc., Portland, USA) plus standard microscopy examination of thick smears (stained with Field's stain) and thin smears (Giemsa stain) for species confirmation.

Quantitative variables are described with median and interquartile range and qualitative variables with frequency distribution. Univariate comparisons were performed using the  $\chi^2$  test. The probability value of 0.05 or less was required for statistical significance. SPSS12 software package was used to perform the statistical analysis.

### RESULTS

From January 1999 to December 2004, 118 different cases of imported malaria were detected: 50.4% men and 49.6% women; median age 32 years (P25:16.5; P75:41). The distribution of cases per year was eight in 1999, nine in 2000, 17 in 2001, 19 in 2002, 26 in 2003 and 39 in 2004 ( $p < 0.0001$ ), as shown in Fig. 1. A 91% of patients were

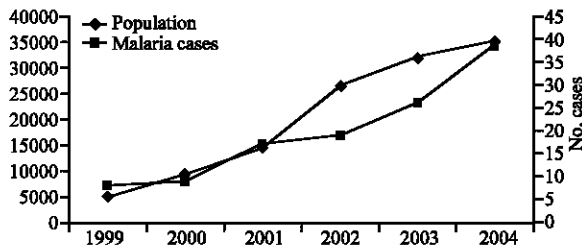


Fig. 1: Evolution of malaria cases and immigrant population in the Health District along the study period

first seen at the hospital Emergency Department (Adult and Pediatrics) while the remaining 9% of blood examination requests came from other inpatient departments or directly from the GPs of the Health District. The frequency of patients by age group was clearly higher in the group of children under 10 years of age and in the group of adults 31 to 40 year-old.

*Plasmodium falciparum* was the most frequent species observed, accounting for 68% of all cases, followed by 6.7% *P. malariae*, 2.5% *P. vivax* and 0.8% *P. ovale*. A 7.6% of mixed infections was also found, mainly *P. falciparum* plus *P. malariae*; in 14.4% of cases-mainly those detected outside the hospital-*Plasmodium* sp. was reported without further species identification. Only one case of severe complicated malaria was seen in a 2 year-old child who required blood exchange in addition to standard pharmacological treatment and recovered uneventfully.

Among the 98 patients from whom the country of origin was known, 98% were Africans-mainly from Equatorial Guinea (68.4%) and Nigeria (16.3%)-while just a mere 2% were Latin American.

## DISCUSSION

Due to the increasing number of immigrant workers or refugees from tropical countries, malaria is again an important health problem to be aware of in European places where the disease was already eradicated years ago. More recently, malaria in the Madrid area is being observed mainly in those immigrants already settled in Spain for months or even years, probably with a job, who return to Madrid after a short vacation period visiting their countries of origin.

The analysis of cases through the period of study showed the sustained increase of malaria patients from eight cases in year 1999 to 39 in year 2004 ( $p < 0.0001$ ), parallel to the rise of the immigrant population from malarious areas along 6 years ( $p < 0.0001$ ). It should be

stressed, however, that immigration figures are possibly underestimated given the limitations of official immigration records. Other reports in European countries also describe an increasing proportion of malaria cases occurring in nonnationals (Bochatay *et al.*, 2006; Gascon, 2006; Castela *et al.*, 2003; Romi *et al.*, 2001; Schlagenhauf *et al.*, 2003; Williams *et al.*, 2002).

A raised awareness of clinicians in our Health District about this and other imported diseases of immigrants might have possibly contributed to a higher number of thick smear requests and parasitemia detection. As a consequence, a conjoint program was designed in 2004 involving the "Severo Ochoa" Hospital, some district GPs and the Public Health service, for integral boarding of malaria in immigrants, addressing detection, diagnosis, notification and health education for preventing new cases. Use of chemoprophylaxis as well as other protective measures during travel should be recommended to this already non-immune population who perceive their risk to be low.

The figures of *Plasmodium* species found and sources of infection are similar to those reported in France (Danis *et al.*, 2002) and United Kingdom (Ladhani *et al.*, 2006) but somehow different to that in Germany (Schoneberg *et al.*, 2003) or in the whole Europe (Muhlberger *et al.*, 2004) where *P. vivax* is the second most frequent species after *P. falciparum*, probably reflecting the different origin of imported cases in various European countries.

The observed binodal distribution of patients' age seems to tally with our assumption of a population mainly composed by middle-age immigrants settled for some years in Madrid as well as with their young children already born in Spain who visit their parent's countries for the first time; in this setting, both no longer semi-immune parents and naive children, would then be malaria susceptible hosts when visiting areas of high transmission. Therefore, these may be potentially avoidable cases if suitable preventive measures were used.

In spite of this rising number of falciparum malaria cases in this southwest Madrid urban area, potential reemergence of indigenous malaria in Madrid is very unlikely as a consequence of mosquito ecology and biology. The long time known existence-where present-of refractory *Anopheles* species (*An. maculipennis atroparvus*, *An. claviger*, *An. hispaniola*, *An. plumbeus*) to Afrotropical *P. falciparum* in Spain (Zulueta *et al.*, 1975) and the absence of breeding places due to field draining practices for agricultural purposes during the second half of the last century in the central plateau of the Iberian peninsula, including new large urban areas in southwest

Madrid, make the probability of transmission virtually nil, unless improbable dramatic changes in autochthonous mosquito faunas happen (Kuhn *et al.*, 2002, 2003) as stated by other reports from southern European countries (Romi *et al.*, 2001).

### CONCLUSION

Malaria in the Madrid area is being increasingly observed in African immigrants already settled in Spain who return to Madrid after a short vacation period visiting their countries of origin.

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