

# Imported malaria in the UK: advice given by general practitioners to British residents travelling to malaria endemic areas

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**SUMMARY.** *General practitioners are in a key position to provide advice to those travelling to malaria endemic areas. A study of at-risk travellers revealed that 54% visited their general practitioner before their intended trip overseas and of these 79% were given advice about antimalarial precautions. Of those advised 98% carried antimalarial tablets with them on their trip but only 46% had any knowledge of other methods of personal protection against malaria. Fewer non-white than white British residents received information from their general practitioners.*

*It is suggested that general practitioners should be better informed about current malaria transmission and currently recommended chemoprophylactic drugs and dosages. It is also suggested that the major public health priority should be to stimulate a greater involvement of non-health service agencies in order to make the public aware of the risk of malaria and seek medical advice before travel.*

## Introduction

'MALARIA holds first place among the exotic diseases increasingly observed in countries with temperate climates.'<sup>1</sup> The number of notified cases of malaria in the UK rose steadily from 363 in 1972 to 1625 in 1979. This has been overtaken by a provisional figure of 1698 for 1985. Furthermore, the number of notified cases of the more serious falciparum malaria and the number of deaths associated with malaria in the UK continues to rise.<sup>2</sup>

It has been suggested that 'since the public health barriers built for the days of shipping have fallen down, the major responsibility for dealing with imported diseases has fallen on the shoulders of the general practitioner. He is now our front line of defence.'<sup>3</sup> Reports of the efficiency of advice given by general practitioners are widely divergent. Lopez<sup>4</sup> stated that travellers usually follow advice given by general practitioners, whereas Maegraith<sup>5</sup> wrote 'the ordinary traveller hardly ever approaches a general practitioner before he goes abroad and is unlikely to get much help even if he does'. These opinions are subjective and no good objective data exists on which to base such statements.

The object of this study was to determine the knowledge and use of methods of personal protection against malaria of British residents travelling to malaria endemic areas, and to examine the role of the general practitioner in providing advice about such methods.

## Method

The study group was selected from passengers travelling with British Airways to malaria endemic areas (as defined by *Weekly Epidemiological Record number 31*<sup>6</sup> and the World Health

Organization booklet *Vaccination requirements and health advice to international travellers*<sup>7</sup>), and who departed from Terminal Three at Heathrow Airport during a one-week period in August 1984. Only those passengers who were considered to be at risk of contracting malaria, and who were normally resident in the UK were included in the study. Air and sea crew, members of the armed forces, long-term overseas residents, children under two years of age and doctors were not included. Appropriate flights were identified and passengers were then selected by a systematic sampling protocol approaching every fourth person entering the gate lounge. Those that fulfilled the inclusion criteria were interviewed by the author. Data were collected by means of a directly administered questionnaire. Questions of set sentence structure were used in order to reduce bias, and the use of closed questions with limited response options facilitated coding. Both the questionnaire and coding schedules were validated by a short pilot study. A Sirton Computer 60K microcomputer at the London School of Hygiene and Tropical Medicine was used for analysis of the data. Statistical analyses were performed using the chi-square test with one degree of freedom.

## Results

Three hundred and twenty-three passengers were identified as fulfilling the inclusion criteria and all but three consented to be interviewed. The characteristics of the respondents were as follows: 66 were aged 2–19 years, 159 20–39 years and 95 over 40 years; 89 were tourists, 118 business travellers and 113 visiting friends and relatives; 226 were white and 94 non-white; 121 were travelling to the Indian subcontinent, 80 to Africa, 83 to South-east Asia and 36 to the Middle East.

Of these travellers 71% were carrying antimalarial tablets. A significantly higher proportion of white travellers were carrying antimalarial tablets (79%) than non-white travellers (53%) ( $\chi^2 > 10.8$ , 1 df,  $P < 0.001$ ). After controlling for possible confounding variables, for example length of stay, previous experience with antimalarial tablets, and country visited, the difference was still significant at this level using a Mantel Haenszel chi-square test (Campbell H. Imported malaria in Britain. MSc thesis. University of London, 1985).<sup>8</sup> Of those travellers carrying antimalarial tablets 82% had started to take them before boarding the flight.

Fifty-four per cent of the travellers had visited their general practitioner before travelling overseas for a reason related to the trip (Table 1). A higher proportion of white tourists had consulted a general practitioner than any other category of passenger ( $\chi^2 > 10.8$ , 1 df,  $P < 0.001$ ).

Of the passengers who visited their general practitioner, and who informed him of their intended travel, 79% were given advice concerning malaria. Significantly more white respondents received advice (87%) than non-white respondents (60%) ( $\chi^2 > 10.8$ , 1 df,  $P < 0.001$ ).

Among white passengers, business travellers were less often advised about malaria by their general practitioner than tourists ( $\chi^2 > 7.9$ , 1 df,  $P < 0.01$ ). General practitioners may assume that business travellers have either been advised by their company medical service or already know of the risk of malaria and

**Table 1.** The number of travellers who visited their general practitioner before their trip overseas and the number given advice about malaria protection: comparison by race and reason for travel.

Reason for travel	No. of travellers	No. (%) who contacted GP	No. (%) of those contacting GP given advice
<i>White travellers</i>			
Tourist	69	52 (75)	49 (94)
Business	83	39 (47)	28 (72)
Visiting friends and relatives	38	16 (42)	16 (100)
Total	190	107 (56)	93 (87)
<i>Non-white travellers</i>			
Tourist	14	9 (64)	4 (44)
Business	8	2 (25)	1 (50)
Visiting friends and relatives	72	36 (50)	23 (64)
Total	94	47 (50)	28 (60)
Overall total <sup>a</sup>	284	154 (54)	121 (79)

<sup>a</sup>Travellers to the Middle East excluded as only white passengers were travelling to that destination.

**Table 2.** The number of travellers who contacted their general practitioner before their trip who were carrying antimalarial tablets and the number with knowledge of at least one other method of personal protection: comparison by race and whether advice received from general practitioner.

	No. of travellers	No. (%) carrying tablets	No. (%) with knowledge
<i>White travellers</i>			
Advised by GP	103	101 (98)	55 (53)
Not advised by GP	16	8 (50)***	10 (63)
Total	119	109 (92)	65 (55)
<i>Non-white travellers</i>			
Advised by GP	28	27 (96)	5 (18)
Not advised by GP	19	9 (47)***	4 (21)
Total	47	36 (77)	9 (19)
Overall total	166	145 (87)	74 (45)

\*\*\* $P < 0.001$ . For white travellers advised and not advised  $\chi^2 > 7.9$ , 1 df; for non-white travellers  $\chi^2 > 7.9$ , 1 df.

**Table 3.** Source of advice for the 240 travellers with no prior knowledge of the need for antimalarial chemoprophylaxis (total  $n = 320$ ).

Source of information	No. of travellers advised only by this source	Total no. (%) of all travellers advised by this source
GP	63	92 (29)
Company doctor	39	50 (16)
Friends/relatives	26	43 (13)
Travel agent	18	30 (9)
Airline	10	15 (5)
Specialist health centre	4	10 (3)

methods of personal protection from past experience of travel. However, the proportions of business travellers who carried antimalarial tablets (82%) and knew of other methods of personal protection (63%) were not higher than for other travellers.

Table 2 shows the proportions of travellers who had contacted their general practitioner before their overseas trip and were carrying antimalarial tablets, and those who knew of at least one other method of personal protection against malaria, for example window screening, insect repellent cream, pyrethrum coils, knockdown sprays or covering up the skin after dark. These were compared according to racial group and whether or not they received advice from their general practitioner. Almost all travellers who received advice subsequently obtained antimalarial tablets and carried them with them. However, only 46% of those advised had knowledge of at least one other method of personal protection against malaria. The level of knowledge of this group was not significantly different to the level of knowledge of the group not receiving advice from their general practitioner. This contrasts markedly with the significantly different rates of carrying antimalarial tablets of the two groups. The inference is that general practitioners do not provide travellers with adequate information about other methods of personal protection against malaria.

Many travellers were well aware of the need for antimalarial chemoprophylaxis. For the 240 travellers that had only just learnt of this, Table 3 indicates the sources of this information. The general practitioner was the most important source of such advice, except among business travellers for whom it was the company doctor.

A wide variety of chemoprophylactic regimens were prescribed. The 32 travellers travelling to areas with recognized chloroquine resistance and who either knew the names or could show evidence of their tablets, were found to be carrying nine different chemoprophylactic regimens. It is also noteworthy that 16 of the 131 travellers receiving advice from their general practitioner were carrying only pyrimethamine tablets. This regimen is now widely considered unsuitable for short-term travellers in view of the widespread pyrimethamine resistance found in *Plasmodium falciparum*. Its use was not generally advised under any circumstances by the Malaria Reference Laboratory at the time of the study and the World Health Organization have specifically stated that they no longer recommend it for personal chemoprophylaxis in non-immune individuals.<sup>6</sup>

## Discussion

Data from the International Passenger Survey of 1982 show that of British residents travelling to areas of the world other than Europe and the United States of America, 92% travel by air.<sup>9</sup> Heathrow Airport is by far the most important exit port for British residents travelling to malarious areas.<sup>10</sup> British Airways carry approximately one quarter of all air traffic from Britain to the Indian subcontinent and Africa, which are the areas that account for about 70% of cases of imported malaria. Although sufficient in number to merit study in their own right, travellers with British Airways may not be representative of the population of all British residents travelling to malaria endemic areas, thus limiting generalization of results. No suitable data exists to allow further examination of all British travellers.

## Source of advice

The general practitioner is approached by few travellers requesting antimalarial advice and yet he is expected to be able to give up-to-date information. The constantly changing pattern, distribution and level of malaria risk and drug resistance within the malarial parasite, together with the significant morbidity and mortality associated with some of the recommended

chemoprophylactic agents dictate that expert advice be sought. It has been recognized that general practitioners have need of a ready resource describing current malaria transmission and reviewing currently recommended prophylactic drugs and doses.<sup>11</sup> Concern has been expressed that many general practitioners may use unsolicited publications as their major sources of advice. There is a need for discussion of how to provide such information most effectively. Computerization of regularly updated advice compiled by one of the reference centres and made available locally through family practitioner committee computers would seem to be a promising method. Such data could then be modified and made available to travel agents, airline offices and businesses that employ personnel in areas with malaria.

### Risk estimation

In deciding on the advice to be given, it is necessary to balance the risk of malaria against the risk associated with the antimalarial drugs recommended. The visitor to tropical Africa and coastal Papua New Guinea is at considerable risk of contracting the disease and protection should be as complete as possible. In parts of some countries classified as malarious, more detailed information may show that there is little or no risk. In particular, if travellers only intend to visit major cities or high altitude areas, their risk of contracting malaria may be small. Several recent publications have drawn attention to the toxicity of antimalarial drugs.<sup>12-14</sup>

Although a similar proportion of white and non-white travellers visited their general practitioner a significantly higher percentage of white travellers received advice regarding malaria protection than non-white travellers. Non-white British residents are also at risk from malaria. Those non-whites born and brought up in Britain are not immune to malaria and those who have immigrated to Britain are usually at risk since immunity wanes relatively quickly and a symptomatic attack may result after an absence of two to three years from malaria endemic areas. Concern has been expressed that non-white travellers are less well protected from malaria than white travellers.<sup>8</sup>

### Antimalarial advice

This study shows that 98% of at-risk travellers receiving advice from their general practitioners subsequently carried antimalarial tablets. However, only 46% of those receiving advice could name another method of personal protection against malaria. The emergence of drug resistance and the increasing recognition of major toxicity associated with some antimalarial drugs highlight the important role of other methods of personal protection against malaria.<sup>15</sup> The results from this study suggest that general practitioners should place more emphasis on these measures.

### Public health impact

If all travellers that visited their general practitioner in this study had been given appropriate advice and acted upon it, the percentage of travellers carrying antimalarial tablets would only have risen from 71% to 77%. If an impact is to be made on the increasing problem of imported malaria it will be necessary to involve non-health-service agencies such as travel agents and airline companies since they make contact with most travellers. Using such agencies it would be possible to inform all travellers of the risk of malaria and recommend that they seek advice from the health services.

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## Smoking and metabolism

The effect of smoking on energy expenditure is reported in eight healthy cigarette smokers who spent 24 hours in a metabolic chamber on two occasions, once without smoking and once while smoking 24 cigarettes per day. Diet and physical exercise (30 minutes of treadmill walking) were standardized on both occasions. Physical activity in the chamber was measured by use of a radar system. Smoking caused an increase in total 24-hour energy expenditure (from a mean value [ $\pm$ SEM] of 2230 $\pm$ 115 to 2445 $\pm$ 120 kcal per 24 hours;  $P < 0.001$ ), although no changes were observed in physical activity or mean basal metabolic rate (1545 $\pm$ 80 versus 1570 $\pm$ 70 kcal per 24 hours). During the smoking period the mean diurnal urinary excretion of noradrenalin increased from 1.25 $\pm$ 0.14 to 1.82 $\pm$ 0.28  $\mu$ g per hour ( $P < 0.025$ ), and mean nocturnal excretion increased from 0.73 $\pm$ 0.07 to 0.91 $\pm$ 0.08  $\mu$ g per hour ( $P < 0.001$ ). These short-term observations demonstrate that cigarette smoking increases 24-hour energy expenditure by approximately 10%, and that this effect may be mediated in part by the sympathetic nervous system. The findings also indicate that energy expenditure can be expected to decrease when people stop smoking, thereby favouring the gain in body weight that often accompanies the cessation of smoking.

Source: Hofstetter A, Schutz Y, Jequier E, Wahren J. Increased 24-hour energy expenditure in cigarette smokers. *N Engl J Med* 1986; 314: 79-82.