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## Tropical Medicine

# Malaria prophylaxis: survey of the response of British travellers to prophylactic advice

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### Abstract

A cohort study was conducted to determine the compliance of travellers with chemoprophylactic advice given over the telephone by the malaria reference advisory service. Travellers who visited their general practitioner first for advice about malaria prophylaxis were often advised to consult a specialist service themselves.

Compliance fell in travellers who were given complicated information and those who received conflicting advice when they contacted other advisory services. After returning to Britain 48%

of the travellers reported that they were fully compliant with prophylactic advice; over a third of the travellers studied did not maintain prophylaxis on their return.

### Introduction

The number of cases of imported malaria in Britain has risen from 101 cases in 1970 to 2212 in 1985.<sup>1</sup> This increase is related to the expansion of the travel industry and to the resurgence of malaria owing to the resistance of malaria vectors to insecticides, poor management of control programmes, and the spread of strains of *Plasmodium falciparum* resistant to chloroquine and the newer alternative antimalarial combinations.

The prevention of malaria in travellers consists of drug prophylaxis and antimosquito measures to reduce exposure to mosquito bites. In the past 20 years new drugs have been introduced and new fixed or variable combinations of drugs have been recommended for prophylaxis as alternatives to chloroquine or proguanil. Advisory sources have often given conflicting advice as to which of these combinations provides the most effective prophylactic regimen—for example, one study found that 15 different prophylactic regimens were being taken in Dar es Salaam, Tanzania.<sup>2</sup> Studies of specific groups of travellers have determined whether they sought advice<sup>3</sup> and carried or took prophylactic drugs.<sup>4,6</sup> No previous study has monitored travellers both before

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TABLE I—Sources of advice and the order in which travellers contacted them

Source	No of people who had contacted another source first	No of people who contacted another source afterwards	Ratio of previous to subsequent consultations
Work	8	71	1:9
General practitioner	39	293	1:3
Travel agent	7	38	1:5
Thomas Cook Limited	3	8	1:3
Friend or relative	15	37	1:2.5
Department of Health and Social Security	7	12	1:2
Chemist	50	56	1:1
Hospital for Tropical Diseases	10	5	2:1
Malaria reference laboratory	425	47	9:1

TABLE II—No (%) of travellers who recalled prophylactic advice correctly related to type of advice given

Recall	Type of advice given by malaria reference advisory service			Total
	More than two regimens suggested	One regimen suggested	Other	
Correct	10 (19%)	141 (86%)	49 (76%)	200 (71%)
Incorrect	42 (81%)	23 (14%)	17 (24%)	82 (29%)

$\chi^2=85.8$ ;  $p<0.001$ .

TABLE III—Times at which travellers failed to comply with prophylactic advice

	No of travellers not fully compliant (n=170)	No as % of all those not fully compliant	No as cumulative % of all travellers
Before departure	23	13	7
During visit	35	21	18
On return to UK	12	7	21
After return	24	14	29
Within four weeks after return	76	45	52

TABLE IV—Travellers' reasons for failure to comply with prophylactic advice

Time	Stated reasons*						No reason given
	Forgot	Considered to be unnecessary	Advised to stop	Side effects	Ill	Other	
Before travel	4	1	5†			13§	
During travel	4	5	11‡	2	4	2	12
On return	27	12		8	5	1	23

\*Some travellers gave more than one reason for not fully complying.

†Advised that no prophylactic was needed before travel.

‡Advised by local people or friends.

§Travel planned at short notice; no tablets available.

and after travel to determine whether they comply fully with prophylactic advice or whether they stop taking antimalarial drugs and, if so, for what reasons.

## Subjects and methods

The malaria reference advisory service received 1680 inquiries over six weeks in July and August 1984. A 20% random sample of 336 inquiries was selected for study, using tick sheets. Data were collected in three ways: firstly, a questionnaire was completed by the advisers during the initial telephone inquiry; secondly, the research worker questioned travellers by telephone before their departure; and, thirdly, a questionnaire was posted to travellers for completion six weeks after their return to Britain.

Data were analysed using the statistical package for social sciences. Significance was assumed at the 5% level ( $p<0.05$ ).

## Results

### STUDY POPULATION

We followed up 312 travellers who made inquiries, of whom 282 were contacted, representing 529 travellers. Four hundred and thirteen questionnaires were completed and returned before May 1985.

Of all the inquiries, 224 (66%) were made by travellers or their companions. Only 39 (12%) inquiries were made by general practitioners and 73 (22%) by other health workers—for example, chemists and nurses. Over half of all travellers making inquiries had first sought advice from their general practitioner, who referred them to the malaria reference advisory service.

Generally, two to three advisory services were contacted for information (range one to seven for information about vaccination and one to four for information about prophylaxis). Travellers were asked in what order they had contacted the various services (table I). Most had contacted their general practitioner first and the malaria reference advisory service last.

The 336 travellers making inquiries sought advice on behalf of 644 travellers, of whom 574 were adults and 70 were children. Of all the travellers, 418 (65%) were tourists and 125 (19%) were business travellers. Forty (6% of those making inquiries sought advice for medical or research workers, and only 23 (4%) did so for members of minority ethnic groups now settled in Britain. Of those making inquiries, 108 (34%) sought advice for travellers who were departing within two weeks, of whom 55 were leaving within a week.

### UNDERSTANDING OF ADVICE

The advisers recorded that 257 travellers making inquiries fully understood the recommendations given and that 57 had some problems in understanding the advice. Understanding seemed to be reduced when complicated advice was given by telephone. Misunderstandings may also occur when other services recommend alternative drugs. There was a highly significant difference in travellers' ability to recall information, which was closely related to the type of information given. Table II shows that travellers' recall of the information given was poor when advisers had suggested two or more prophylactic regimens. Travellers were able to recall recommendations correctly if only one prophylactic regimen had been recommended. In table II travellers who received confirmation of advice already given, or who were advised that prophylaxis was unnecessary, were classified as "other." Of the 42 who did not recall correctly the

recommended drugs when more than two had been advised, 24 could remember only one prophylactic regimen. Other advisory services contacted by the travellers recommended different prophylactic regimens, causing confusion and misunderstanding. Of the 123 travellers who sought advice from other services, 95 (77%) were given different prophylactic advice.

### COMPLIANCE

Travellers were sent postal questionnaires after they returned home, which asked about their health and the use of prophylactic measures while overseas and on return. Of the 326 respondents who had been advised to take prophylaxis, 156 (48%) complied fully. Non-compliance occurred mainly when travellers returned to Britain (table III); 66% stopped treatment or complied only partly and most stopped before the specified four weeks after return. Table IV shows the reasons given for non-compliance.

## Discussion

This is one of the first studies to monitor a cohort population longitudinally to identify what proportion of travellers comply with prophylactic advice. Less than half the population at risk in this study took antimalarial treatment as prescribed. The malaria reference advisory service uses skilled advisers, and, as shown in table I, few travellers sought further advice after contacting the service. If so many travellers fail to adhere to advice given by this service it seems likely that compliance with malaria prophylaxis is generally very low.

The main reason given for non-compliance was forgetfulness, suggesting a lack of motivation to maintain full prophylaxis.<sup>7</sup> This generally occurred when travellers returned to Britain.

Two other factors were also shown to affect compliance. Firstly, when local people or members of travellers' peer groups advised against prophylaxis, and, secondly, some travellers simply could not remember the drug dose and regimen correctly. Written information from a specialist source would thus be a useful reminder of the original advice.

Prophylaxis reduces the risk of malaria. The national surveillance data for 1985 collated by the malaria reference laboratory showed that 463 (21%) of the 2212 travellers who contracted malaria were reported to have taken some form of prophylaxis.<sup>1</sup> This study highlights the difficulty of ensuring that travellers implement health advice. Although few general practitioners contacted the advisory service directly, over half of all travellers had been advised by general practitioners to telephone the service themselves. This suggests that several general practitioners do not have prophylactic information directly at hand or that they do not consider it to be their responsibility, or do not have time, to seek advice on behalf of travellers.

In addition, our results suggest that travellers cannot cope with complex prophylactic information given over the telephone and that it is necessary to write complicated advice down. General practitioners should recognise, therefore, that any information reported back to them by their patients may not be correct.

Prophylactic information can be too detailed. This study showed clearly that when conditional information was given, with treatment with two or more prophylactic regimens advised, the advice was not remembered fully. Conditional advice, as given over the telephone, is therefore limited and should perhaps be avoided. Additional confusion arises when travellers "shop around" for information and numerous prophylactic regimens are recommended to them. One third of the inquiries in this study were made on behalf of travellers departing within two weeks. Such short notice leads to confusion and rushing and does not allow for acute allergic drug reactions being detected and an alternative drug selected before departure.

Over half of all patients with imported malaria are Asian immigrants living in Britain,<sup>1</sup> but only 4% of inquiries were made on their behalf. Three quarters of the travellers who had sought advice from another service were recommended different drug regimens which caused confusion and anxiety. We suggest that advice should be standardised.

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*One of my patients yawns two or three times an hour all day long, day in, day out. Is such a condition pathological and what might be the cause?*

Remarkably little is known about the cause of yawning, a common reflex act that occurs in man and in animals, affecting the pharynx, the respiratory and other skeletal muscles, and the lungs. It is generally believed to be an expression of boredom or of drowsiness, and for some strange reason it seems to spread from one person to another in company. Because of this occasional yawning is to most people, including doctors, a source of either mild amusement or embarrassment, depending on who does the yawning, and never a cause for concern. Persistent yawning may be a different matter. If it has continued for several years without any other symptoms it is unlikely to be pathological, although there is a remote possibility that it could be a rare manifestation of focal epilepsy or an unusual form of tic. If, however, the persistent yawning is of recent origin it could conceivably be a feature of encephalitis, meningeal disease (infective or malignant), or raised intracranial pressure from any cause, such as cerebral tumour or abscess. These possibilities, though slender, would warrant referral to a neurologist, who might find it necessary to undertake investigations such as examination of the cerebrospinal fluid, electroencephalography, and computed tomography scanning.—IAN W B GRANT, consultant respiratory physician, Edinburgh.

*Is there any explanation for a patient who is hypersensitive to insulin to the extent that 1 or 2 units will induce hypoglycaemia?*

It should first be confirmed that the supposed increased sensitivity to insulin is genuine and not the result of a mistake in the technique of measuring the insulin, or of injecting it inadvertently into a small blood vessel. The latter may be avoided by aspirating with the syringe before injecting the insulin subcutaneously. The possibility of factitious hypoglycaemia also needs consideration. If the patient is taking drugs such as a sulphonylurea, which may stimulate the secretion of endogenous insulin in a mild

diabetic, or a  $\beta$  blocker, which may inhibit the counterregulation to insulin, then causes of truly abnormal sensitivity to insulin need to be considered. One such is renal failure, for it has been shown experimentally that there may be a clearance of up to two thirds of insulin in the blood perfusing the kidneys, mainly by enzymic degradation. Thus the half life of insulin increases as the renal mass decreases.<sup>1</sup> The degree of increased sensitivity to insulin shown by this patient, however, suggests that there is a deficiency in its normal circulating antagonists—that is, mainly cortisol from the adrenal cortices and growth hormone from the anterior pituitary. This may be tested safely in hospital by an intravenous insulin tolerance test,<sup>2</sup> which shows the inadequate rate of recovery from the hypoglycaemic nadir. The test may be made more meaningful by measuring also the response of cortisol and growth hormone in the plasma.—JOHN M STOWERS, professor of diabetes, Aberdeen.

- 1 O'Brien JP, Sharpe AR Jr. The influence of renal disease on the insulin I<sup>131</sup> disappearance curve in Man. *Metabolism* 1967;16:76-83.
- 2 Bolli GB, De Feo P, De Cosmo S, *et al*. A reliable and reproducible test for adequate glucose counter-regulation in type I diabetes mellitus. *Diabetes* 1984;33:732-7.

*A middle aged woman has suffered from migraine for many years. Recently she developed acute appendicitis and had her appendix removed, since when her migraine has improved. Is there any link between these two events?*

It is often the case that after an abdominal operation such as appendectomy, cholecystectomy, and hysterectomy, migraine improves. It does not seem to be related to any specific procedure or history of abdominal discomfort. There is no direct link between the events, and it just adds to the enigma of migraine that such procedures can be followed by improvement which may last for months or be permanent.—K J ZILKHA, consultant neurologist, London.