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COMPLIANCE WITH PREVENTIVE MEASURES AGAINST MALARIA BY VISITORS TO THE VACCINATION CENTRE OF THE UTRECHT MUNICIPAL HEALTH SERVICE

by

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SUMMARY

A selected group of 200 visitors to the vaccination centre of the Utrecht Health Service took part in an investigation concerning their compliance with antimalarial measures as advised by the staff of the centre. For data collection a postal questionnaire was used.

Chemoprophylaxis was used correctly by 52% of the respondents. No difference in compliance was found between users of the two prophylactic regimens advised at the time of the investigation, i.e. proguanil daily alone or, the more complicated regimen, proguanil daily combined with chloroquine once a week.

Anti-mosquito measures were applied daily by 44% of the respondents. The use of long sleeves and trousers (32%) and repellents (17%) scored highest. Only 4% used bednets daily.

Finally, the results indicated that more attention should be given to malaria prevention in pregnant travellers.

CONTENTS

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1. INTRODUCTION

The incidence of imported malaria among Dutch travellers returning from areas in the tropics increased slowly but steadily during the last ten years. In 1988 there was a sharp rise in the number of cases reported: 153 in 1987 and 260 in 1988. The incidence remained high in 1989 and 1990: 244 and 248 cases, respectively (Bijkerk & Postema, 1989; Postema, 1990; Bilkert-Mooiman, 1991). Many malaria patients did not take adequate antimalarial measures. Some patients did not use antimalarial tablets at all during their stay in malaria-endemic areas; others did not take their malaria prophylaxis as advised before departure (Stuiver et al., 1983). Also, many travellers to malaria-endemic areas do not take their antimalarial tablets properly (Phillips-Howard, 1990; Steffen, 1988). This study was designed to obtain information on actual compliance with malaria prophylaxis and other antimalarial measures by visitors to the vaccination centre of the Utrecht Municipal Health Service in order to help improve the impact of the advice given.

2. PREVENTIVE MEASURES AGAINST MALARIA

2.1 Advisory procedures at the vaccination centre

The vaccination centre advises some 7500 travellers yearly. Many intend to visit malaria-endemic areas. Traveller health consultants instruct each visitor individually on the risk of malaria in his or her destination and the chemoprophylaxis and other measures needed for local protection. In addition, each traveller is given extensive printed information.

2.2 Chemoprophylaxis

With regard to chemoprophylaxis, the centre applies the instructions of the Netherlands Ministry of Health (Geneeskundige Hoofdinspectie van de Volksgezondheid, 1987), which are, depending on the countries visited, the following:

Regimen A	proguanil chloride,[1] 100 mg daily[2]
Regimen B	proguanil chloride,[1] 100 mg daily plus 300 mg chloroquine base weekly (three tablets of 100 mg chloroquine base each); during the first week a loading dose of 600 mg chloroquine base.

The prophylaxis is to be started on the day of departure to a malaria-endemic area and is to be continued for four weeks after leaving that area.

2.3 Anti-mosquito measures

Anti-mosquito measures include:

* bednets;
* mosquito-repellent substances;
* protective clothing to be worn outside from dusk to dawn;
* sleeping in mosquito-free rooms.

3. METHODS

3.1 Study design

The study was carried out by means of a questionnaire.

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[1] Proguanil hydrochloride = proguanil = Paludrine.

[2] The Ministry of Health advises currently a daily dose of 200 mg Paludrine.

3.2 Population

The study population was selected as follows. During a period of five weeks 502 visitors to the vaccination centre were asked to participate in the study. Travellers who did not meet the following criteria were excluded from the study:

* age between 15 and 69 years (children were excluded because they are not responsible themselves for their malaria prophylaxis);
* Dutch nationality (because of the postal questionnaire - people had to read and understand a text written in Dutch);
* one person per postal address (two or more travellers returning from the same area and completing the questionnaire at the same time would induce bias);
* length of stay 1 to 6 weeks (long-stay travellers were excluded for practical reasons);
* visit to a malaria-endemic area.

During the five-week period 233 visitors met the selection criteria. Of these, three persons cancelled their journey before departure and another 19 refused to participate in the investigation.

3.3 Data collection

All participants received a postal questionnaire three weeks after returning from malarious areas. A questionnaire is a practical and acceptable way of measuring compliance, although there is probably some underreporting as compared with direct measures such as blood or urine sampling (Gordis, 1979). The questionnaire covered the travellers' medical history, pre-travel sources of health information, destination(s), use of chemoprophylaxis, use of anti-mosquito measures, and the travellers' opinion on some statements concerning malaria and its prevention.

Travellers who did not respond within a period of three weeks, were again sent a questionnaire. If they still did not respond, they were asked by telephone to return the completed questionnaire as soon as possible.

3.4 Criteria for non-compliance

Non-compliant travellers were those who:

* did not use malaria prophylaxis at all;
* terminated prophylaxis during their stay abroad or within four weeks after returning home;
* frequently missed a dose;
* had not taken the double starting dose of chloroquine;
* used a different regimen.

3.5 Data processing and analysis

Data processing was carried out with D-base III plus. Relations between nominal variables were tested with a two-tailed chi-square test with $\alpha = 0.05$.

4. RESULTS

The response was high: 201 questionnaires (86%) of the 233 sent were returned. One of these arrived too late to be included in the analysis. The study population consisted therefore of 200 persons of whom 50% were men (see Table 1).

TABLE 1. STUDY POPULATION BY AGE AND SEX

	Men	Women	Total
Age 15-29 years:	22	44	66 (33%)
Age 30-49 years:	63	47	110 (55%)
Age 50-69 years:	15	9	24 (12%)
Total	100	100	200 (100%)

Ninety-four per cent (N = 187) of the respondents used antimalarial tablets, of whom 17 stopped already during their stay in the tropics. Most travellers kept to the regimen advised: only 8 of 187 decided to apply a different regimen. Two per cent of the respondents answered that they had often forgotten to take their prophylaxis, 29% forgot seldom and 69% never. Many travellers ceased to take their antimalarial tablets after returning home (Table 2). No difference was found between users of proguanil alone and users of proguanil and chloroquine.

TABLE 2. DURATION OF USE OF MALARIA PROPHYLAXIS AFTER RETURNING HOME

	Proguanil N = 47	Proguanil + chloroquine N = 128
Stopped immediately after return	6%	11%
Stopped < 4 weeks after return	26%	27%
Still using or used > 4 weeks	68%	62%

Most travellers (167 of 200) still took antimalarial tablets after returning home. Of these, 10% stated that they frequently had forgotten to take the tablets. Another 45% seldom forgot malaria prophylaxis. The remaining 45% took all antimalarial drugs as advised. Of the proguanil users, 27% took their tablets always regularly, 65% for the most part regularly, and 8% often irregularly. For chloroquine these figures were 76%, 21% and 3%, respectively. The travellers who stopped antimalarial drugs after returning home reported many reasons for not complying with the advice on chemoprophylaxis given (Table 3). The most frequently reported reasons were the opinion that it was no longer necessary to take the tablets at home and forgetfulness.

The information obtained on the use of anti-mosquito measures is given in Table 4. Repellents were used mainly during the evening and at night. Many brands were used, most of which contained as the active substance diethyltoluamide (deet) in different concentrations. Of all respondents 56% applied none of the anti-mosquito measures daily.

TABLE 3. REASONS GIVEN BY TRAVELLERS FOR TERMINATING CHEMOPROPHYLAXIS DURING THE 4-WEEK POST-TRAVEL PERIOD (N = 56)

Reason	% of travellers	No.
Not necessary (according to respondent)	34	19
Forgot	21	12
Side effects	13	7
Ran out of tablets	11	6
No/low malarial risk	11	6
Advised by somebody	9	5
Saw no mosquitos	7	4
Pregnancy	4	2
Other	14	8

TABLE 4. USE OF ANTI-MOSQUITO MEASURES BY TRAVELLERS (N = 199)

	Daily	Not daily	Never
Bednets	4%	29%	67%
Repellents	17%	39%	22%
Protective clothing	32%	46%	22%
Mosquito-free bedrooms	9%	20%	71%

Fifty-two per cent of all respondents complied completely with advice (cf. 3.3). Men (43%) complied less than women (61%). All three age groups adhered to the chemoprophylaxis indicated equally well. There was no relationship between the destination of the respondent and compliance with advice on the use of antimalarial tablets. There was no significant difference in compliance between users of the proguanil (58%) and the proguanil + chloroquine (50%) regimen.

Of the respondents who took antimalarial tablets entirely according to the prescription (N = 104), 45% applied at least one of the various anti-mosquito measures; of 96 persons who did not take antimalarials as indicated, 43% used at least one means of protection against mosquitos. There was no relationship between destination and compliance with chemoprophylaxis.

The Utrecht health centre was not the only source of health information on malaria prevention. Only 35% of the travellers did not consult other sources of information (Table 5).

TABLE 5. SOURCES OF INFORMATION AND ADVICE ON HEALTH MATTERS OTHER THAN THE UTRECHT HEALTH CENTRE CONSULTED BY TRAVELLERS (N = 197)

Source of information	% travellers	No.
General practitioner	8	16
Other physician	6	12
Folder/brochure	8	16
Travel guide	16	32
Family/friends	36	71
Past travel	5	10
Other	11	22

5. DISCUSSION

More than 90% of the visitors to the Utrecht Health Service vaccination centre used antimalarial tablets during at least part of their journey, but only 50% complied fully with the chemoprophylaxis regimen advised. These numbers correspond with the results obtained by some other investigators: Campbell (1985) observed 74% compliance, Lobel et al. (1987) 67%, Coole et al. (1989) 63%, and Steffen et al. (1989) 90%. Bruné et al. (1988) reported 71% compliance among a sample of 77 visitors to the Leiden University Hospital vaccination centre.

Unfortunately, the comparability of the studies mentioned above is hampered because of differences in methodology, but most importantly because of the absence of well-defined chemoprophylaxis compliance criteria. Analysis of non-compliance data based on such criteria is needed not only for a correct understanding of the size of the problem, but, more importantly, its nature. The latter is a precondition for improving orally provided information, as well as written instructions and advice for travellers.

No significant difference in compliance was found between users of proguanil alone and users of the combined regimen of proguanil + chloroquine. As the study population is small, there must be some reserve in drawing conclusions. Apparently, a rather complicated prophylactic regimen consisting of two antimalarials with a different prescription is not an important obstacle for compliance, providing the regimen has been properly explained and the traveller has been well motivated by the adviser.

Two further points derived from the results call for attention. The first is the finding that many members of the study population stopped their chemoprophylaxis too soon after returning home. To motivate travellers to continue medication, the need should be more intensively emphasized in both the oral advice and written instructions. The second is the observation that both of the pregnant women in the study group did not take antimalarial measures. A *Plasmodium falciparum* infection poses serious problems when acquired during pregnancy, e.g. more serious disease, risk of abortion or pre-term labour, contra-indication of many therapeutic antimalarials. Apart from the question whether they should visit a particular area, special attention should be given to instruct and motivate pregnant women to follow the chemoprophylactic regimen concerned as correctly as they can. Also, the importance of applying one or more anti-mosquito measures should be stressed to this group.

Finally, very few travellers used any anti-mosquito measures at all, and if they did, generally only one. In view of the widespread and rapidly increasing resistance to antimalarials in various parts of the world, travellers should be made better aware of the possibilities and importance of applying such measures.

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RESUME

Un groupe de 200 personnes sélectionnées ayant consulté le centre de vaccination du Service de Santé d'Utrecht a pris part à une enquête concernant l'observance des mesures antipaludiques conseillées par le personnel du centre. Un questionnaire postal a été utilisé pour la collecte des données.

La chimioprophylaxie a été suivie correctement par 52 % des répondants. Aucune différence d'observance n'est apparue entre les utilisateurs des deux schémas prophylactiques conseillés au moment de l'enquête, à savoir la simple prise quotidienne de proguanil ou un schéma plus complexe associant une prise quotidienne de proguanil à une prise hebdomadaire de chloroquine.

Les mesures antimoustiques ont été appliquées quotidiennement par 44 % des répondants. Les mesures le plus souvent citées étaient le port de vêtements à manches longues et de pantalons (32 %) et l'utilisation de répulsifs (17 %). Seuls 4 % des répondants se servaient quotidiennement de moustiquaires.

Enfin, les résultats indiquent qu'il faudra accorder davantage d'attention au problème de la prévention du paludisme chez les femmes enceintes qui voyagent.

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