Lepr. Rev. (1978) **49**, 283–286

Reliability of Dapsone Self-administration by Leprosy Patients in the Rangoon Area

KIN MA GYI, MAUNG MAUNG LWIN, YI YI MYAING, KHIN MAW OO

Department of Pharmacology, Institute of Medicine 2, Rangoon, Burma

and

TIN SHWE

Leprosy Hospital, Htauk Kyant, Rangoon, Burma

The application of urine tests to assess the reliability of dapsone self-administration by leprosy patients in the Rangoon area is described. Dapsone/creatinine ratios were determined on urine samples collected from the patients and the results compared with those from supervised controls. The results obtained demonstrated that the taking of dapsone by patients attending the out-patient dispensaries of the Rangoon General Hospital Skin Department and both the out-patients and in-patients served by the Htauk Kyant Hospital was good. However patients from Hlegu, Hwawbi, Htauk Kyant and Taik Kyi villages appeared to take dapsone rather irregularly. Possible reasons for their poor compliance are discussed and suggestions are made as to how they might be encouraged to take their dapsone more regularly.

Introduction

Dapsone has been used for the country-wide treatment of leprosy since the institution of antileprosy campaigns in Burma. It still remains the drug of choice for the world-wide treatment of leprosy (Ellard, 1974). Most patients receive their treatment from out-patient clinics or through a system of drug distribution by leprosy health workers. The successful mass treatment of leprosy is therefore largely dependent on the regularity with which patients take the drugs they are given and also upon the effectiveness of the drug distribution system.

Dapsone is almost completely absorbed from the gastrointestinal tract and up to 90% of the dose is excreted in the urine as unchanged drug together with its metabolites (Israeli *et al.*, 1973). Estimation of dapsone in the urine should therefore indicate whether a patient is regularly taking the prescribed treatment. There, can, however be a wide range of dapsone concentrations in

Received for publication 22 June 1978.
0305–7518/78/040283 + 04 $01.00/0

urine samples from patients taking the same dosage of the drug. This variability is largely due to the effects of diuresis and can be greatly reduced by estimating the creatinine concentration of the urine and expressing the results as the ratio of the concentration of dapsone (μg/ml) to that of creatinine (mg/ml) D/C ratio) (Ellard *et al.*, 1974*a*,*b*; Low and Pearson, 1974). This paper describes the results of such analyses on samples obtained from out-patients and in-patients in the Rangoon area.

Patients and Methods

The study was composed of 3 parts. In the first part dapsone/creatinine (D/C) ratios were determined on urine specimens collected from patients in the Htauk Kyant leprosy hospital 24 h after they had received the 4th consecutive supervised daily dose of 50 mg dapsone. Ratios were also determined on control urine samples obtained from patients and staff not receiving dapsone. In the second part of the study D/C ratios were determined on surprise urine samples collected from out-patients attending the dispensaries of the Htauk Kyant and Rangoon General Hospitals, from patients from Hlegu, Hwabi, Htauk Kyant and Taik Kyi villages, and from in-patients of the Htauk Kyant leprosy hospital. All these patients should have been taking 50 mg dapsone 6 days a week. Finally, D/C ratios were determined on urine samples collected every day for 15 days from 10 normal volunteers who took 50 mg dapsone daily for the first 4 days.

Dapsone, plus its diazotizable metobolites, was estimated by the method of Bratton and Marshall (1939) as modified by Ellard *et al.* (1974*b*). Creatinine was determined by the alkaline picrate method. Urine samples were preserved by the addition of half volume of 2N HCl and dapsone and creatinine estimations completed within 1 month of urine collection. The proportion of prescribed doses taken by the patients was calculated according to the procedure of Ellard *et al.* (1974*a*).

Results

The results summarized in Table 1 show that the self-administration of dapsone by patients attending the out-patient dispensary of the Rangoon General Hospital was excellent, and that the compliance by both the in-patient and out-patient at the Htauk Kyant leprosy hospital was also good. However it was estimated that less than half of the prescribed dapsone doses were being taken by patients from the 4 villages studied. Figure 1 illustrates the progressive increase in the D/C ratios of urine samples obtained from the 10 normal volunteers after daily administration of 50 mg dapsone, peak ratios being obtained on the 5th day 24 h after giving the final dose. Thereafter the D/C ratios declined steadily and reached pretreatment values by the 11th day.

Discussion

In order to minimize the chances of patients relapsing with dapsone-resistant leprosy, it is essential that they should take their prescribed treatment

TABLE 1

Ratios of dapsone/creatinine in urine samples from different groups of patients in the Rangoon area

Origin of samples	Number of subjects	Dapsone/creatinine ratios Range	Mean*	Estimated % doses taken†
Controls not on dapsone	20	1.0– 7.1	3.7 ± 0.4	0
Supervised controls on dapsone	20	6.0–135.2	34.9 ± 7.5	100
In-patients				
Htauk Kyant hospital	56	4.0– 89.5	29.4 ± 2.9	82
Out-patients				
Htauk Kyant hospital	45	0.7–134.9	25.6 ± 2.9	70
Rangoon General Hospital	45	2.7–132.5	e4.2 ± 4.8	98
Hlegu village	35	1.7– 60.6	17.7 ± 3.0	44
Hmawbi village	46	1.0– 56.8	13.3 ± 1.7	31
Htauk Kyant village	33	2.1– 59.7	17.0 ± 2.4	43
Taik Kyi village	45	0.5–120.5	19.0 ± 3.8	49

*Mean ± standard error of mean (μg/mg).

† $\frac{\text{Mean test ratio} - \text{Mean blank ratio}}{\text{Mean control ratio} - \text{mean blank ratio}} \times 100.$

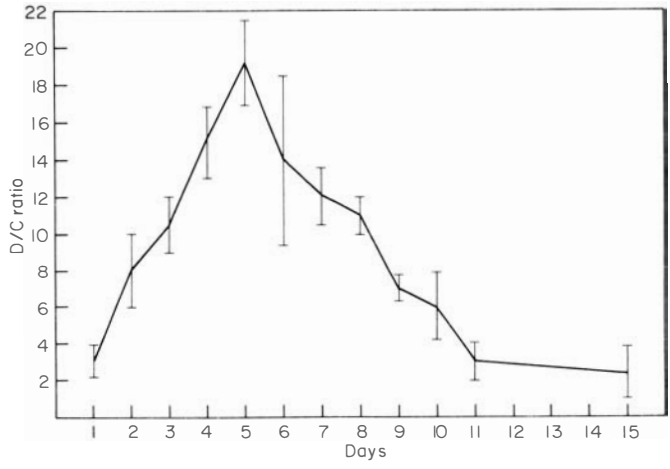

Fig. 1. Ratios of dapsone/creatinine in controls after taking 50 mg dapsone daily from day 1 to day 4.

regularly. Many field workers consider that leprosy patients are generally unreliable in this respect and that as a consequence their treatment should be given under the closest supervision possible. This study supports such a view since out of the 305 patients studied (including 56 hospital in-patients), over half (159) were estimated to be taking less than 50% of their prescribed

dapsone. This finding is in agreement with the results obtained among African patients by Ellard *et al.* (1974*a*) and Low and Pearson (1974).

In this study the most compliant patients were those attending as hospital out-patients. These patients are very keen to obtain treatment and attend the dispensaries of their own volition. Clearly their motivation has also ensured that they take their dapsone treatment regularly. The results obtained among the in-patients of the Htauk Kyant leprosy hospital also indicate that the supervision of their treatment in the hospital is generally satisfactory. However the patients from the 4 villages studied do not appear to self-administer their dapsone regularly.

Three possible reasons are suggested for their poor compliance; namely inadequate supervision of their treatment, inadequate motivation on the patients' part, and lack of proper selection of patients for release from more strictly controlled treatment to the leprosy villages.

The treatment of patients in the 4 leprosy villages clearly needs to be more effectively supervised. When their supplies of dapsone are distributed, a full explanation needs to be given concerning the importance of regular drug taking and it is essential that they be instructed by someone in whom the patients have faith and trust. The person giving them their medication needs to be available whenever the patients need help or advice during the course of their treatment since the quality of the patient/physician relationship is probably the most important determinant of patient compliance. Medical officers, lady health visitors, nursing staffs posted in that area or country health workers, in order of preference, probably suit the role better than the present junior leprosy workers.

There should be effective health education and a reward system for reliable and improving patients. Regular urine tests should be carried out to assess the reliability of patients in taking their prescribed treatment. Those cases who are well controlled clinically and bacteriologically should be released from control. If these measures cannot be carried out there should be a system for regular administration of drug to the patients.

Acknowledgement

We are most grateful to Dr S. E. Smith, W.H.O. adviser, for his help and advice and to the World Health Organization for supplying us the chemicals required for this study.

References

Bratton, A. C. and Marshall, E. K. (1939). A new coupling component for sulfanilamide determination. *J. biol. Chem.* **128,** 537.

Ellard, G. A. (1974). Recent advances in the chemotherapy of leprosy. *Lepr. Rev.* **45,** 31.

Ellard, G. A., Gammon, P. T. and Harris, J. M. (1974*a*). The application of urine tests to monitor the regularity of dapsone self-administration. *Lepr. Rev.* **45,** 224.

Ellard, G. A., Gammon, P. T., Helmy, H. S. and Rees, R. J. W. (1974*b*). Urine tests to monitor the self-administration of dapsone by leprosy patients. *Am. J. trop. Med. Hyg.* **23,** 464.

Israili, Z. H., Cucinell, S. A., Vaught, J., Davis, E., Lesser, J. M. and Dayton, P. G. (1973). Studies of the metabolism of dapsone in men and experimental animals: formation of N-hydroxy metabolites. *J. Pharmac. exp. Ther.* **187,** 138.

Low, S. J. M. and Pearson, J. M. H. (1974). Do leprosy patients take dapsone regularly? *Lepr. Rev.* **45,** 218.