Ethyl Esters of "Pongamia Glabra" in the Treatment of Leprosy.

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Introduction.—In the Ayurvedic system of medicine five oils have been recommended as curatives in the treatment of leprosy ; and of these five, hydnocarpus wightiana is given the first place. Next in importance comes " Pongamia Glabra." Hydnocarpus wightiana is already in universal use in the treatment of leprosy, and so far there is no reference in the literature to the use of pongamia glabra. It was, therefore, considered desirable to try the effect of pongamia glabra in leprosy, and Dr. E. Muir, of the Calcutta School of Tropical Medicine, was consulted about the advisability of using the oil. He told the writer that some years back he had himself tried the oil and found it to be too irritating when injected. He therefore advised caution in using it.

A pure sample of the oil was obtained from Messrs. Ernakulam Trading Co., Ltd., and was filtered and sterilised before use. Olive oil free from fatty acids was used as a dilutent, and a one in ten dilution of the oil was injected in a few selected cases, subcutaneously. Gradually the dilution was weakened and the pure oil was used. No marked irritant effect was noticed and it was therefore considered safe for use. As the oil was too viscid it could not be used intradermally. Ethyl esters had to be prepared, but there was no known technique for preparing the esters of pongamia glabra, and the optimum proportion of the oil, alcohol and acid had to be worked out by actual experiments. Preliminary experiments with different proportions of the oil, the acid and the alcohol, were carried out, and a satisfactory method of preparing the esters was arrived at.

Technique of Preparation (in brief).—The optimum proportion of the oil, alcohol (absolute) and sulphuric acid pure (sp. Gr. 1.845) was found to be 1, 1.25, 0.015 or 100, 125, 1.5. On this proportion the oil, alcohol and acid were mixed and the mixture boiled for 24 hours in a flask fitted with a reflux condenser. The separated esters were then washed with distilled water thrice and neutralised with 0.4 per cent. anhydrous sodium carbonate repeatedly, until no free acidity could be detected by titration with N/20 sodium hydroxide. After a second washing with distilled water, thrice, steam was passed into the esters for half-an-hour, to remove the volatile impurities. After filtering again,

the esters were dried in an open pan type of container, in oil bath and filtered once again and sterilised by heating to 130 deg. C. for half-an-hour. Plain sterilised esters were used.

Technique of Administration.—With a view to ascertaining the therapeutic efficacy of the esters when administered by different routes, three batches of cases were selected. In the first batch of eight cases the pongamia esters alone were given intradermally in all the active lesions found on their bodies ; in the second batch of six cases the pongamia esters alone were given intramuscularly and no other antileprotic remedies were used, not even trichloracetic acid painting externally. One case of this batch had to be given occasional intradermal injections just to satisfy him. In the third batch of three cases, the pongamia esters were injected intradermally into the lesions on the right side and, for the sake of comparison, the ordinary half per cent. ethyl esters of hydnocarpus wightiana injected similarly into the lesions on the left side. For this batch, only cases with fairly symmetrical lesions on both sides of the body were selected, so as to render the comparison of results easy and fair.

Results of Treatment.—Of the 17 cases treated for periods varying from six to eighteen months, seven showed apparent clinical improvement, but there was no appreciable effect on the bacteriological findings. The *M. leprae* in the lesions did not seem to have been affected by the drug. Next, comparing the results obtained by the different methods of administration, it was noted that those treated by the intradermal method had shown comparatively greater improvement than those having intramuscular injections only. Probably this comparatively greater improvement (clinical) obtained by those having intradermal injections is due to the fact that such injections in hypopigmented and, or erythematous patches, exert a rapid and noteworthy effect in restoring the normal pigment of the skin in such patches. In fact, the chief effect of this drug seems to be to produce a localised hyperpigmentation of the skin, when injected intradermally, in the injected areas ; and when injected intramuscularly also, the same hyperpigmentation is noticed all over the skin surface, and it takes longer to produce this hyperpigmentation. This melanogenetic or melanopoietic action seems to be a special feature of the drug ; and is *not* due to the irritation caused by injections of a foreign body into the skin. When injected into the healthy skin it first produces a hyperpigmentation

at the site of injection, which remains for a month or two and then gets slowly absorbed, finally leaving the injected area slightly darker than the surrounding skin. The hyperpigmentation produced by the drug was directly proportional to the natural complexion of the case treated with it. Dark complexioned cases showed a literally " coal-black " hyperpigmentation, and lighter complexioned cases showed a lighter black and brownish-black sort of hue. This noteworthy melanogenetic or melanopoietic effect can be utilised in cases of leucoderma—and it is hoped that this drug may have a future before it, as an effective remedy in leucoderma.

To ascertain the efficacy of this drug in cases of leucoderma, three cases of leucoderma of not more than two or three years duration, were given intradermal injections of the esters into the leucodermic areas. With weekly intradermal injections, all the leucodermic areas became hyperpigmented. But the drug failed to exert any effect in a case of leucoderma of 20 years' standing. Probably in such long-standing cases the melanoblasts are dead. In recent cases it seems to have a noteworthy effect.

All the relevant particulars regarding the cases of leprosy treated by this drug are given overleaf in tabular form.

Summary and Conclusions.

(1) Pongamia glabra oil and ethyl esters were tried in 17 cases of leprosy by three different methods of administration.

(2) The pure oil and its ethyl esters can be used intradermally as well as intramuscularly.

(3) When injected intradermally into hypopigmented or erythematous patches of leprosy, or in leucodermic areas, it produces an intense hyperpigmentation, presumably by stimulating the melanoblasts.

(4) When injected intramuscularly, a general darkening of the complexion all over, results, and this takes some time to become evident.

(5) The drug has no effect, apparently, on the *M. leprae*, the causative organism of leprosy.

(6) Its melanogenetic or melanopoietic action may bring the drug into therapeutic prominence in cases of leucoderma, which are not very long standing.

Serial No.	Name.	Type on admission.	Nature of infection.	Period of treatment.	Total No. of injections.	Dose range in c.cms.	Result of final examination.	Bacteriological examination Final result.	Remarks.
				yr. mth.					
1	Jhunki	C1 N2	I.D.I.	1 2¾	57	2 to 5½	Improved	RAE 1/20, LHE 1/M RTBS4 6/1, nose 1/M	
2	Champa	C3 N2	I.D.I.	1 1wk	49	½ to 4	Stationary	All M/1	
3	Robni Muchi	C3 N2	I.D.I.	0 10	40	1 to 4	Improved	—	
4	Dhumi	C3 N1	I.D.I.	1 2½	58	1 to 4½	Stationary	RHE 4/1, LHE 4/1, chin 11/5, nose M/1	Intracellular forms
5	Bilasi	N2 N3	I.D.I.	0 10	40	½ to 2½	Stationary	—	
6	Bishtu	C3 N2	I.D.I.	1 3¼	61	2 to 6	Improved	Rt. eyelid M/1	Intracellular forms
7	Magru	N2	I.D.I.	1 1	52	2 to 6	Improved	chin 3/1, nose M/1 —	
8	Rajoni Kanto	C3 N1	I.D.I.	1 ½	50	½ to 4	Improved	RHE M/1, LHE M/1 nose M/1	Granular forms Intracellular
9	Sodai	C1 N3	I.M.	1 1½	54	2 to 3	Stationary	Nose 1/1, chin 4/1 RHE 1/1, Lt. eyebrow 10/1	Granular
10	Ahlad	C3 N2	I.M.	0 10	40	½ to 2	Slightly Improved	Skin of nose 30/1 chin 6/1, RHE 4/1 LHE 10/1, nose M/1	Intracellular
11	Ashari	C1 N2	I.M.	0 7½	30	1 to 2½	Improved	Nose 1/10, RHF neg., RTBS neg.	
12	Dileswar	C1 N2	I.M.	1 2	56	2 to 2	Slightly Improved	LHE M/1, RHE M/1 nose M/1, rt. eyebrow M/1	Intracellular
13	Sukua Sordar	C3 N2	I.M.	0 10	40	2 to 4	Slightly Improved	Chin M/1, nose M/1, skin of nose M/1, lt. eyebrow M/1	
14	Bandhona	C3 N2	I.M. & I.D.I.	1 1wk	49	2 to 5	Improved	Chin M/1, RHE M/1	
15	Pano	C3 N2	K.E., Rt.I.D. H.E. Lt.I.D.	0 6¾	27	½ to 1	Improved	LHF 10/1, RHF 4/1 RHE and LHE 8/1, nose	Intracellular
16	Sombhu	C3 N2	,,	0 8¾	35	½ to 1	Slightly Improved	M/1 all over	
	Revajali	N2	,,	1 5	43	½ to 3½	Improved	—	

I.D.I.—Intradermal injections. I.M.—Intramuscular injections. yr.—year. mth.—months. M/1—many bacilli per field. 4/1—four bacilli per field, and so on, the numerator indicating the average, the number of bacilli per field. At least 10 fields were examined for the average.

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