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TECHNICAL DISCUSSIONS - SUB-COMMITTEE A

ANCYLOSTOMIASIS

SOME HAEMATOLOGICAL ASPECTS IN ANCYLOSTOMIASIS

by

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Following are some observations on the haematology of hookworm disease investigated by means of new techniques. These confirm and complement the observations of previous authors on ancylostoma anaemia in the Province of Egypt, United Arab Republic.

Thorn's test was carried out on seventeen patients suffering from ancylostomiasis, all of whom had high eosinophil counts. The drop of eosinophil counts in all of them four hours after the intramuscular injection of 25 mg. of ACTH was not marked. The same results were obtained when the test was carried out on twenty-five patients suffering from other parasitic infestations. These results render Thorn's test of no value in cases suffering from parasitic infestations including ancylostoma.

A comparative study of the haemoglobin level was carried out and statistically analyzed for 3242 patients suffering from parasitic infestations and 972 negative controls i.e. patients from the same population who were found negative for parasites. Annex I shows the results of this analysis which manifests that the lowest haemoglobin levels are associated with ancylostomiasis whether alone or associated with other parasites in the same host. Haemoglobin levels were estimated by the Sahli method. The sahli haemoglobinometers were standardized to give a 100% value equivalent to 14 - 14.2 gms. of haemoglobin per 100 ml. blood.

The blood of each of fourteen patients suffering from ancylostomiasis was studied electrophoretically for the detection of any possible abnormal haemoglobin. The runs were carried out on Whatman No.1 paper strips using

350 volts D.C. and barbiturate buffer (pH 8.6), for 18-24 hours. All blood samples showed normal haemoglobin A. The bloods of five of these patients were re-examined during treatment for abnormalities in the newly manufactured haemoglobin but only haemoglobin A was demonstrated.

For an approximate estimation of the life span of the red cells in ancylostomiasis a relatively simple method was used applying radioactive chromium^{51} in the form of Sodium radiochromate. This is called the apparent half survival time of Cr^{51}-tagged red cells. In this method the patient's own red cells are tagged with Cr^{51} and are re-injected. Then samples are taken twice weekly and the activity in certain volume of red cells is measured by the scintillation counter. The results are plotted on semilogarithmic paper. The time taken for half the activity to disappear is the half-survival time of the Cr^{51} - tagged red cells, after taking into account the physical decay of the radioisotope. Despite the fact that the attachment of Cr^{51} to the red cell is fast a 1% daily diffusion outside the normal red cell has been observed which must also be taken into account. But as the measurements are taken as compared with the behaviour in the normals, there is no fear of serious error.

In five normal individuals this half-survival time was found to range from twenty-five to thirty-nine days. In six ancylostoma infested patients the range was found to be twenty-eight to thirty-seven days. In three patients suffering from severe ancylostoma anaemia the range was found to be twenty-one to twenty-seven days. One patient had a half-survival time of seven days when his haematocrit value was 14%, which was raised to twenty-six days when the haematocrit value was raised to 29%. It appears that the initial low value of the last case may be due to more rapid diffusion of the isotope from the anaemic cell, or due to relative dilution in the standard volume of the red cells taken for measurement during regeneration of blood rather than actual premature senescence of these anaemic cells as no other method has proved actual haemolysis. Further study in this respect is being carried out at the present time to elucidate these points.

ANNEX I

HAEMOGLOBIN LEVEL IN PARASITIC INFESTATIONS

Infestation	No. of Cases	Hb% Range	Hb% Mean	S.E.	S.D.	C.V.
1. Negative Controls	972	65-115	91.25	.3085	9.62	10.52
2. Ancylostoma	373	20-100	75.277	.8952	17.29	22.96
3. Ascaris	530	55-110	84.425	.47	10.812	20.80
4. Trichstrongylus	111	35-110	85.94	1.30	13.74	15.98
5. Oxyuris	202	60-110	88.56	.575	8.17	9.22
6. Taenia	103	50-105	80.13	1.146	11.63	14.51
7. Hymenolepes nana	119	55-110	81.98	1.058	11.54	14.07
8. Intestinal Bilharziasis	67	30-110	78.231	2.26	18.52	23.67
9. Urinary Bilharziasis	667	40-100	84.65	.449	11.6	13.70
10. Urinary+Intestinal Bil.	43	40-100	81.94	2.208	14.48	17.67
11. Urinary Bil.+Ascaris	159	40-100	81.16	.927	11.69	14.40
12. Urinary Bil.+Ascar.+Ancylo.	119	20-100	74.33	1.61	17.54	23.59
13. Urinary Bil.+Ancylostoma	284	30-100	74.957	.9007	15.18	20.25
14. Ascaris + Ancylostoma	127	20-110	74.186	1.3497	15.21	20.50
15. Other mixed infestations not including ancylostoma	254	45-100	84.5	.734	11.7	13.84
(I) Totals Total mixed infestations including ancylostoma (including also 84 mixed infections other than in annex)	614	20-110	75.037	.6473	16.04	21.37
(II) Total single and multiple infestations other than ancylostoma	2255	30-110	84.167	.249	11.82	14.04
(III) Total single and multiple infestations including ancylostoma	987	20-110	75.128	.5258	16.52	21.98
(IV) All parasites	3242	20-110	81.415	.2469	14.06	17.26

S.E. = Standard error. S.D. = Standard deviation. C.V. = Coefficient variation.

(I) = 12+13+14+a group of 84 cases.

(II) = 3+4+5+6+7+8+9+10+11+15.

(III) = 2+(I).

(IV) = (II)+(III).