

FINDINGS IN 679 CASES OF KALA AZAR IN SANTAL PARGANAS

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ALTHOUGH kala azar or visceral leishmaniasis has been intensively studied by many investigators in various parts of the world (Kirk, 1949; Lubetz; 1948; Lewis and Spieknall, 1948; Ho, *et al*, 1949; Napier, 1949; Cole, 1944) it is such a Kaleidoscopic disease with different manifestations in different times and localities that we have thought it worth while to collect and summarize the findings in 679 cases treated as in-patients during the past 5½ years in our hospital in Santal Parganas, a district of eastern Bihar, just adjacent to West Bengal. This series does not include the kala azar cases which were treated on an outpatient basis during the same years, as our records are for economic reasons too scanty to be of value. Their number would be about double that of the present series, so the total number of cases treated by this hospital and dispensary during the period would approach 2000.

The cases seen from January, 1947, to February, 1951, were treated at Benagaria Christian Hospital, located at Benagaria, just two miles from the West Bengal border. In March, 1951, the hospital was moved 16 miles further into Santal Parganas to Mouhulpahari and became known as the Mohulpahari Christian Hospital.

Cases seen from March, 1951, to March, 1952, were treated, then, at the latter hospital. While we were at Benagaria the bulk of our kala azar cases came from Bengal or its borders. The move further into Santal Parganas lowered the incidence of this disease as seen in our in-patient department from about 10.5% to about 4.5% of the total number of patients (Table 1). This might have been expected, since the disease has long been known to be more prevalent in Bengal than in Bihar.

Table 1.—In-Patient Kala Azar Cases at Benagaria and Mohulpahari Hospitals, Jan. 1, 1947 to Mar. 15, 1952.

An interesting aspect of the hospital's move further into Santal Parganas was that the percentage of early or acute cases rose sharply from about 5% at Benagaria to about 25% at Mohulpahari. It is our impression that at Mohulpahari we happened to locate in the middle of a small focus of the disease and thus early cases came to us more readily for treatment, whereas at Benagaria, where no local focus of the disease existed, the cases came from some miles away and were therefore slower in presenting themselves for treatment.

Without wishing to enter into the present lively discussion by Bouche, Malone, Brooks, Napier, Smith, Thomas and others (Correspondents, 1951) on the still unsolved problem of the epidemiology of this complex disease, we find nothing in our experience to contradict R. O. A. Smith's cogent reasoning in favour of the sand-fly theory. Our cases come almost entirely from among people who live in houses with mud walls and floors where *Phlebotomus argentipes* is known to thrive.

An interesting epidemiological sidelight from our experience is that dogs appear to play some part in the spread of the disease. We had very few stray dogs around Benagaria and during the years there we had no fresh, early cases from the immediate vicinity. At Mohulpahari, however, where diseased, ulcer-ridden stray dogs are numerous, we have had many of our most acute, early cases from the immediate vicinity.

We are aware of the claim, based on Donovan's investigation of 1150 dogs around Madras (Strong, 1944) as well as the results of other investigators that Indian kala azar does not infect dogs, but we can not understand why Indian dogs should be persistently immune when the dogs of the entire Mediterranean area and China (Strong, 1944; Koenigoting *et al*. 1950) have repeatedly been proven susceptible and are actually heavily infected naturally in kala azar areas. Of the few dogs we managed to examine, splenic smears revealed no *Leishmania donovani*, but we are not yet ready to give up our suspicions that the dog may be a vector in our area.

TABLE I

Year	Kala-azar patients	Total in-patients	Percentage in-patients having kala-azar	Acute early cases	Percentage kala-azar cases that were acute	
Benagaria	1947 ..	87	872	10.0	2	2.3
	1948 ..	165	1,453	11.3	4	2.4
	1949 ..	194	1,836	10.5	11	5.6
	1950 ..	137	1,601	8.6	7	5.1
Mohulpahari	1951 ..	77	1,716	4.5	20	26.0
	1952 (Jan.-Mar.)	19	454	4.1	4	21.0
TOTALS ..	679	7,932	(Avg.) 8.6	48	(Avg.) 7.0	

DIAGNOSTIC CRITERIA

As in all infectious diseases, the diagnosis of kala azar should not be considered final until the causative organism, in this case *Leishmania donovani* (kirk, 1949a), has been found and demonstrated under the microscope.

In our practice, however, we have been compelled to adopt less time-consuming criteria for diagnosis. While in our early experience and in doubtful cases we have fairly often resorted to splenic puncture or sternal puncture Lubitz, 1948; Ho, *et al.*, 1948 to confirm the diagnosis, the great bulk of our cases have been diagnosed by fulfilling these *four basic criteria*:

Chronic fever	leukopenia
Splenomegaly	positive blood aldehyde or antimony test

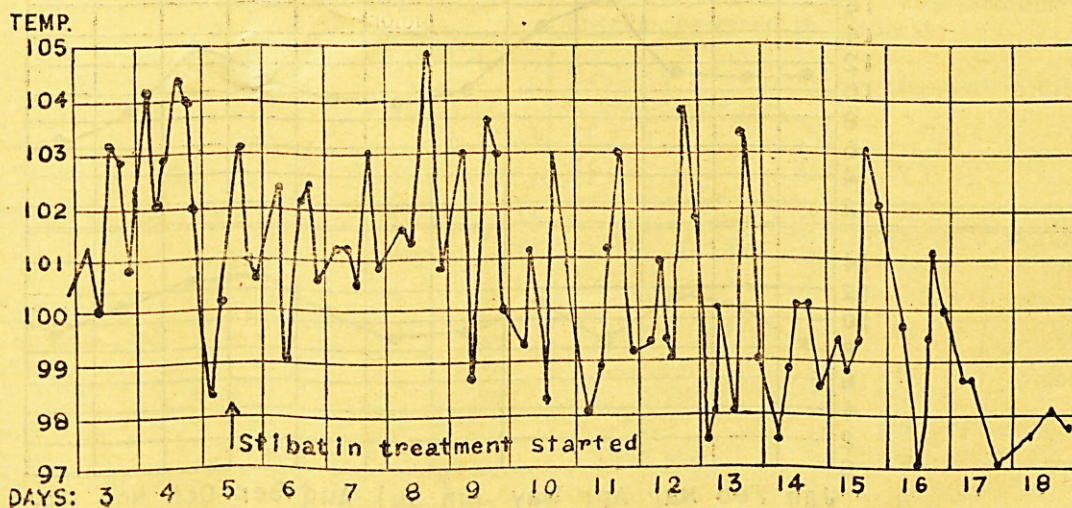
Napier (1949) states that an experienced clinician can diagnose 9 out of 10 cases by general appearance. While we have found helpful such signs as the characteristic smoky-black pigmentation of skin, the muscular wasting of limbs, the oft-visible splenomegaly, the lustreless hair and apathetic facies of a typical cases, we have so often been misled by their presence in negative cases or their absence in positive cases that we have grown wary of diagnosing the disease by appearance alone and have relied more on the above-stated criteria.

All four of the above *basic criteria* were present in about 75 per cent, three of the four in about 90 per cent, and two of the four in about 98 per cent of our cases. We have endeavoured to eliminate from this study any and all cases in which the ultimate clinical diagnosis was in doubt. In chronic, relatively afebrile cases our doubts have sometimes been dispelled by a therapeutic trial with an antimony drug, resulting generally in a reactionary fever followed by subsequent cure as the injections continued. In many acute or early cases which had neither splenomegaly, leukopenia or positive blood tests, we have learned the wisdom of Rogers and Napier's observation that a "double remittent" type of fever curve is practically pathognomonic of early kala azar (Strong, 1944) (See Fig. 1). We have often started treatment on the basis of this finding alone and been gratified to see a high fever drop to normal in from 3 to 10 days, thus establishing in our minds diagnosis.

In certain other early cases we found that a typhoid-like fever in a patient who appeared too well for typhoid fever was relieved by injections of an antimony drug and thus again the diagnostic doubts in our minds were allayed. The 48 cases, 7% of the total, which we classified as acute, early cases all had either the "double remittent" type of fever curve or a typhoid-like fever curve.

Fig. 1.—Typical "double remittent" fever curve showing daily double rise of temperature in N. M., Mohammedan boy, age 7, adm. 22. 10. 51 with history of one month's illness, no splenomegaly, negative aldehyde and antimony tests, leucocyte count varying from 6,200 to 12,800. Diagnosis acute, early kala-azar. Fever abated 12 days after treatment started with daily injections of Stibatin (Glaxo) 100 to 125 mg. each.

Fig. 1.



AGE INCIDENCE

Although Indian kala azar is often said to be a disease especially afflicting young adults, 90 of our cases occurred in children under 10 years of age, 5 of them in 2-years-olds, 5 in 3-year-olds, and 3 in 4-year-olds. In the older age groups, 82 cases occurred in people over 40 years of age. 507 cases, or approximately 75%, occurred in people aged 10 to 39 years. (Fig II). Since about 75% of our in-patients as a whole fall within these three decades of life, we are not prepared to conclude that the disease has any special predilection for young adults, though it is clear that infants under two years of age in our area appear to be unaffected.

SEX INCIDENCE

In this series 61.4% of the patients were males and 38.6% were females. This apparent preponderance of males must be adjusted, however, to the fact that during the same period the hospital's total patients were 58.3% male. In our area women still all too often suffer silently at home! Thus, in this series, corrected figures would show actually a ratio of about 53 males to 47 females, essentially the same as Napier's ratio of 203 to 183. (Correspondents, 1951)

SEASONAL INCIDENCE

In Figure 3, A we have made a composite graph showing the average number of kala azar

Fig. 2.—Distribution of 679 cases of kala azar by 5-year age groups.

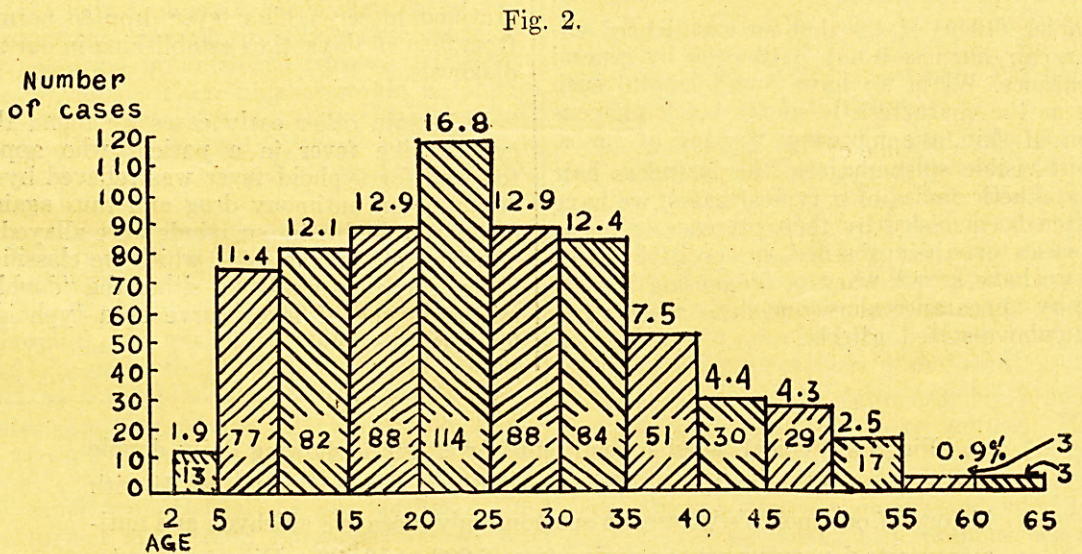
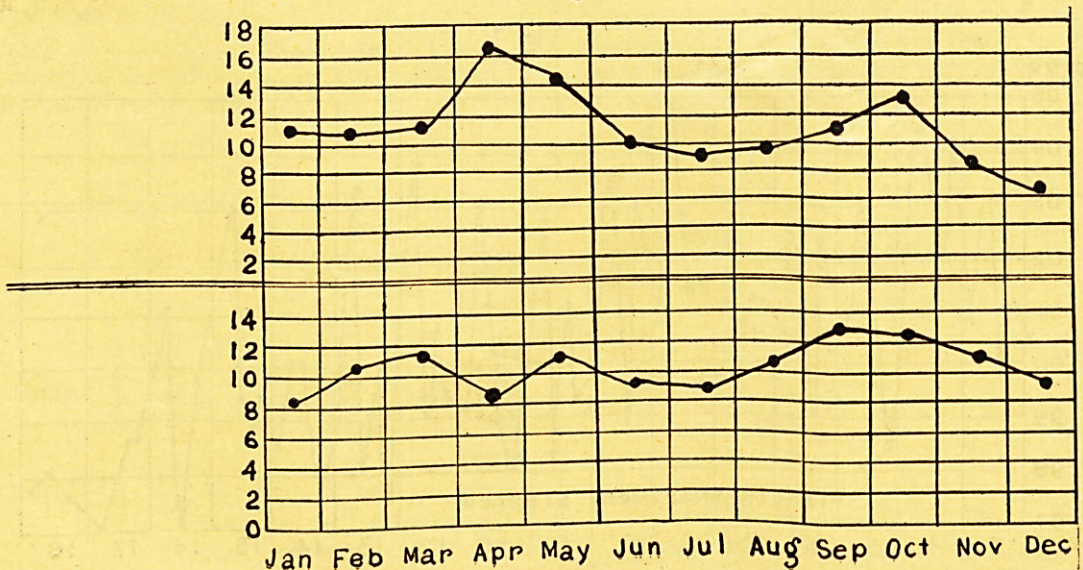


Fig. 2.

Fig. 3.—Monthly incidence of kala azar based on hospital admissions (A) and history of onset (B).

Fig. 3.



patients admitted to our hospital each month, during the five year period, 1947-1951 inclusive. While a graph showing the total admissions for kala azar during each month for all 5 years would indeed, have pointed up an apparent sharp increase of cases in April and October, we have chosen rather to average the number of kala azar cases admitted each month in the five year period in order to give a truer picture of the actual seasonal variations. As one can readily see, except for a slight increase in April and October, there is no significant seasonal variation in the number of cases, based on date of hospital admission.

When we turn to Fig. 3, B where we have made the same sort of composite graph based on the history of date of onset of symptoms, we note that it reveals even less significant seasonal variations than does the preceding portion of the graph. While all medical practitioners know how unreliable patients, memories regarding their illnesses can be at times, we believe there are enough reliable histories represented in these cases to conclude that in our area kala azar may be contracted at any time of the year. These findings differ somewhat from those of others who have studied kala azar in eastern India (Strong, 1944).

DURATION OF ILLNESS

In the 496 of our cases which gave an adequate history the duration of the illness varied from a few days to fourteen years! Some of our cases developed the typical double intermittent fever of acute kala azar right in the hospital after having been admitted for such unrelated conditions as fracture of the elbow, hernia, hydrocele, or chronic cholecystitis. One man, 33 years of age, actually claimed to have suffered from his symptoms for 14 years. The median case in our series had had symptoms for six months. The wide variation in duration of symptoms is shown in the following table.

TABLE II

Time	Number	Percentage
1 week or less ..	10	2.0
2 weeks ..	18	3.6
3-4 weeks ..	45	9.1
2 months ..	45	33.3
3 months ..	47	
4 months ..	35	7.0
5 months ..	23	4.7
6 months ..	71	14.3
7-9 months ..	52	18.1
10-12 months ..	90	10.5
13-18 months ..	11	2.2
19-24 months ..	22	4.4
2 to 3 years ..	16	3.2
3 to 4 years ..	7	2.2
5 years ..	2	
6 years ..	2	
14 years ..	1	

SIGNS AND SYMPTOMS

The signs and symptoms of kala azar that we observed in this series differ somewhat in frequency from those reported by others (Cole, 1944), (Strong, 1944; Burke, 1944) and include a few which we have not found mentioned in the literature. We record them here in the order of frequency in our cases:

1. *Fever* was the most common symptom, oral temperatures above 99 degrees Fahrenheit being recorded in 97.5% of our cases. Maximum recorded temperatures taken from the fever charts averaged 102.4 degrees F., but they ranged all the way from 98 degrees to 106.4 degrees F. The distribution was as follows:

Table III.—Distribution of maximum temperatures recorded in 679 cases of kala azar, given in degrees Fahrenheit.

TABLE III

Maximum temp., °F.	Percentage of cases	Maximum temp., °F.	Percentage of cases
98 to 98.8	2.5	103 to 103.8	19.2
99 to 99.8	9.0	104 to 104.8	15.3
100 to 100.8	16.0	105 to 105.8	2.5
101 to 101.8	13.7	106. to 106.4	0.5
102 to 102.8	21.3		

As regards temperatures recorded, an interesting observation was that under treatment sometimes the temperature became subnormal. In one case this reached 94 degrees F. Subnormal temperatures below 96 degrees F. were considered a grave prognostic sign.

2. *Splenomegaly* was observed in 625 cases or 92.1% of the total. Usually hard, seldom nodular, frequently tender, especially during treatment, the spleens varied in size according to the distribution given in. Table 4.

Table IV.—Splenomegaly observed in 679 cases of kala azar.

TABLE IV

Size of spleen	Number of cases	Per cent of total
No enlargement	54	7.9
One plus ..	110	16.2
Two plus ..	259	38.1
Three plus ..	209	20.8
Four plus ..	47	7.0

3. *Weakness and anemia* constituted the next most common symptom, it being recorded in 225 cases of 37.5% of the total. We measured the hæmoglobin content of the blood, however, only in the more severe cases of anemia, *i.e.*, those falling in the range of 50% of Sahli or below. Certainly many others had mild anemia which went unrecorded. The average hæmoglobin finding in the 181 cases we measured was 42% of normal Sahli. 67 cases had hæmoglobin values below 35% and two had only 15% of normal Sahli.

4. *Hepatomegaly* was observed in 202 cases or 29.7% of the total. This was never observed without a concomitant splenomegaly, usually (in 81%) two to three plus splenomegaly. The livers varied in size according to the distribution given in Table 5.

Table V—Hepatomegaly observed in 679 cases of kala azar.

TABLE V

Size of liver	Number of cases	Per cent of total
No enlargement	477	70.3
One plus (1 to 2 fingers).	164	24.1
Two plus (3 to 4 fingers).	28	4.1
Three plus (5 to 6 fingers).	10	1.5

5. *Cough* due to some form of bronchitis (or vagal irritation from large spleen?) was noted in 112 cases or 16.5% of the total. Twelve cases (2%) had definite findings of pneumonia.

6. *Diarrhœa* was noted in 106 cases or 15.6% of the total. This symptom sometimes appeared only under treatment and was often severe enough to produce 15 to 20 stools daily. It did not always respond readily to symptomatic treatment with camphorated tincture of opium and bismuth subcarbonate. Specific treatment was of course given for such associated causes of dysentery as giardiasis (7 cases), bacillary dysentery (8 cases) and amebiasis (48 cases, about half of which had little or no diarrhœa) but our impression still remains that diarrhœa can often be a dis-symptom due to kala azar itself. Of the 38 deaths in our series diarrhœa was a direct cause of a death in 3 cases and a contributory cause in 8.

7. *Pitting edema* of the legs, varying from one to four plus, was noted in 92 cases or 13.5% of the total. This is slightly less than Napier's 16%. We have assumed that this symptom generally indicated kidney damage and, indeed, 61 cases showed one plus albuminuria and 1

case two plus albuminuria (9% of all cases). In addition, 50 cases, not all manifesting edema, were found to have a trace of albuminuria. Thus 112 cases or 16.5% had at least albuminuric evidence of nephropathy. Nine cases (1.4%) showed granular casts in the urinary sediment, two had hematuria, nine had pyuria.

8. *Hæmorrhage* in some form was observed in 42 cases or 6.2% of the total. Some of the forms this took seem to be previously unreported. Fifteen had melena or bloody stools (2 fatal), four had hematemesis (all fatal), eight had epistaxis (2 fatal), five had gingival bleeding, four had non-tubercular hemoptysis, two had hemothorax, one of whom required several thoracenteses to relieve the pressure on the lung, two had hematuria, one had hemarthrosis of the knee, and one had an ante-partum hæmorrhage.

9. *Other symptoms* in the order of their importance with the respective number of cases shown in parenthesis include: ascites (26), asthma (11), headache (9), stomatitis (5), pruritic dermatitis (5), vertigo (4), vomiting (4), indigestion (4), cancerum oris (2), delirium (2), unconsciousness (2), and night sweats (2).

LABORATORY FINDINGS

Antimony and Aldehyde Tests. We soon learned that the easiest, quickest and most reliable blood test to use was the well-known Chopra or antimony test. For this we used urea stibamine (Brahmachari) and called it the U. S. test. In 593 cases tested by this means we found 482, or 81.3%, to be positive. The aldehyde test (Napier's) takes longer, is less frequently positive, and appears to become positive later in the disease than the antimony test. Nevertheless, it is often helpful, as our experience, summarized in Fig. 4 shows. In 439 patients tested by this means we found 291, or 66.3%, positive. Of 669 patients tested with either one or the other of the two tests, we found that one of the two was positive in 593, or 88.6%, of all cases. The diagnosis is thus much more certain when both tests are done in each case. This was done in 377 cases with the results shown in Fig. 4.

Trincao's HCI test (1948) for kala azar seems excellent and simple, but as it is still untried in India and our laboratory facilities are limited, we adhered to the older tests.

Leukocyte count. Older clinicians have held that in kala azar the white blood cell count is "rarely over 3000's" and Cole⁸ in his series of 60 cases from East Africa reported that the average leukocyte count on admission was 3100. In our series the average was 3750 and the deviations from average wide (Fig. 5). Only 22.5% of the cases had leukocyte counts below 3000 and 27.7% of the counts were over 5000.

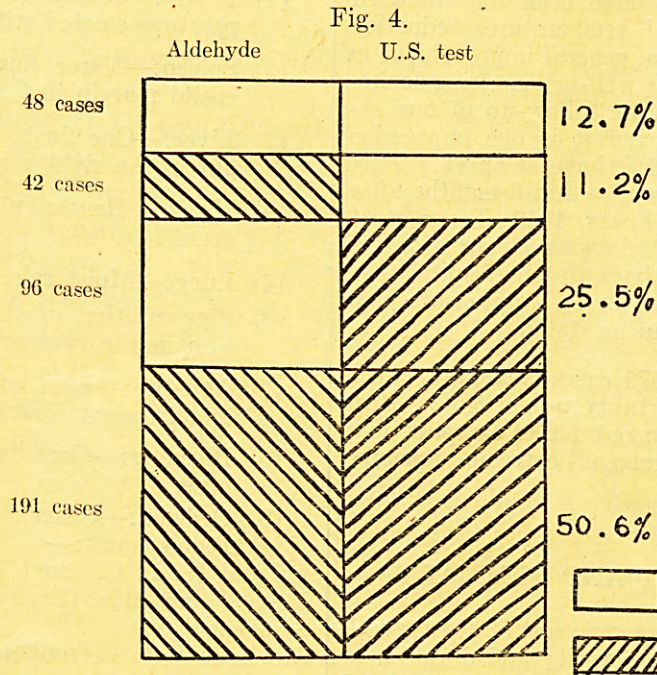
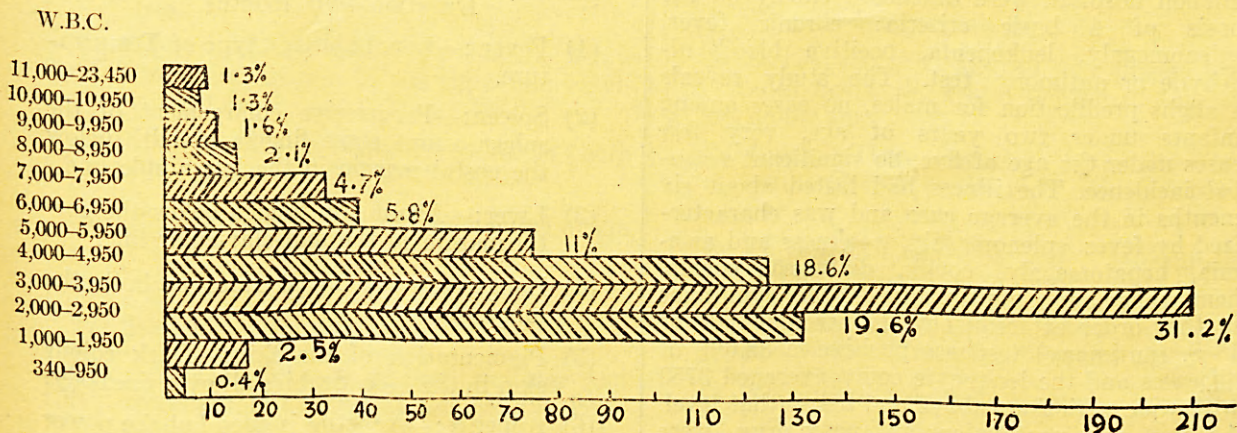


Fig. 4.—Aldehyde (Napier's) and U.S. (Chopra's antimony) test results in 377 cases of kala-azar in which both tests were performed.



Number of cases. Fig. 5.—Leukocyte counts in 674 cases of kala-azar.

Of the extreme leukopenias we saw, the three cases falling below 1000, with counts of 340, 450, and 640 respectively, all proved fatal. Of the 17 cases with leukocytosis over 10,000 five were acute, early cases.

TREATMENT AND RESPONSE

It is not our purpose herein to discuss the treatment of kala azar at length, but simply for the sake of completeness we state that most of our average adult in-patient cases have been

treated on a schedule of urea stibamine (Brahmachari) 0.15 to 0.20 gms. intravenously twice weekly and sodium antimony gluconate (Stibat-in, Glaxo) 300 to 350 mg. intramuscularly daily on 4 or 5 of the remaining days of the week. Out-patients have been given only the twice-weekly urea stibamine injections. Total dosage of the combined drugs has varied with the individual case from 2.4 to 7.7 gms., averaging 4.5 gms. per adult. The response has been good, patients becoming afebrile in from 3 to 20 days, on the average in 9 days after starting treatment and generally being discharge as cured after about 3 weeks in the hospital.

Our criteria of cure have been the standard accepted ones: normal temperature, reduction in the size of the spleen, general improvement in weight, appearance and well-being, rising leukocyte count. No systematic follow-up of our cases has been possible, but it is our impression that only about 2 to 3% have relapsed. Since 99% of all relapses occur within 6 months after the initial treatment (Ecker, 1949; Terry *et al*, 1950) and since cases relapsing in our area are more inclined to come back to our hospital than to seek help elsewhere, we feel quite sure that the relapse rate is about as stated.

Mortality rate. Of 679 cases treated, 38 died, making an over-all mortality rate of 5.5%. Most of the deaths have occurred due to complications like hemorrhage, diarrhoea, extreme anæmia, malnutrition.

COMMENT AND SUMMARY

Kala azar is a kaleidoscopic sort of disease with many variations in the severity and duration of its signs and symptoms as we have observed it in Santal Parganas, Bihar, India. 679 cases treated during a period a little over 5 years, representing 8.6% of the in-patient load in a mission hospital, were diagnosed chiefly on the basis of 4 basic criteria: chronic fever, splenomegaly, leukopenia, positive blood aldehyde or antimony test. The study reveals a slight predilection for males, no cases among infants under two years of age, very few cases under the age of five, no significant seasonal incidence. The illness had lasted about six months in the average case and was characterized by fever, splenomegaly, weakness and anæmia, hepatomegaly, cough, diarrhoea, edema, hemorrhage and a multiplicity of other symptoms in that order of frequency. Either aldehyde or U. S. (antimony) test was positive in 88.6% of all cases and the leukocyte count averaged 3750 with wide variations above and below that level. 4.5 gms. of a pentavalent antimony drug were used on the average to cure a case and the mortality rate for all cases treated was 5.5%; the relapse rate was about 2 to 3%.

Mohulpahari, Santal Parganas, 1st May, 1952.

In view of the new focus a sample survey of the sera was undertaken by the Kala-azar Department of the Tropical School of Medicine, Calcutta, at our suggestion. All sera received for the purpose, from the hospital, were positive by complement-fixation test.—EDITOR, *I.M.G.*

Kala-azar

Case No. 1.

Meru Soren: 20 years Santhal, Female
Complaints—

Duration three months.

Serum No. 1.

- (1) Fever:—double remittent type of temperature started with chill.
- (2) Spleen:—Three fingers breadth below the costal margin in the left nipple line.
- (3) Liver:—One finger below the costal margin in the right mid-clavicular line.
- (4) Heart:—Hæmic murmur in the mitral area.
- (5) Lung:—Moist rales in both the lungs.
- (6) Pigmentation of the skin:—Dark colour skin in the face and legs.
- (7) Appetite:—Loss of appetite, indigestion and frequent diarrhoea.
- (8) Bleeding:—Occasional bleeding from the nose.
- (9) Oedema:—Oedema in both the legs
Blood count:—

Total W. B. C. count 3200 per c.mm.

Hæmoglobin 40% (Sahli)

Serological test

Aldehyde test:—Strongly positive.

Case No. 2.

Serum No. 2.

Moti Soren—3 years: Santhal, male child.

Complaints—

Duration four months.

- (1) Fever:—Low remittent type of Temperature.
- (2) Spleen:—Progressive enlargement of the spleen about three fingers breadth below the costal margin in the left nipple line.
- (3) Liver:—About two fingers below the costal margin in the mid-clavicular line.
- (4) Lungs:—A few moist rales in both the lungs.
- (5) Pigmentation of the skin:—Dark colour skin in the face. Scabies all over the body.
- (6) Appetite:—Appetite is good but the power of digestion is very poor and frequent loose stools with mucus and blood.
- (7) Oedema in both the legs.
- (8) Glands:—Some enlargement of the cervical glands.

Blood count:—

Total W. B. C. count 2700 per c.mm.

Hæmoglobin 35% (Sahli)

Serological test:

Aldehyde test:—moderately strong positive.

Case No. 3.

Serum No. 3.

Name—Ragat Baskey—22 years, Santhal male

Complaints—

Duration—Six months.

- (1) Fever:—Double remittent type.

- (2) Spleen:—Four fingers breadth below the costal margin in the left nipple line.
- (3) Liver:—Palpable two fingers breadth below the costal margin in the right mid clavicular line.
- (4) Lungs:—Crepitant rales in both the lungs.
- (5) Pigmentation:—Dusky appearance of the whole body specially the face.
- (6) Appetite:—Good appetite but power of digestion is poor.
- (7) Oedema in both the legs.
- (8) Bleeds easily from the gums.

Blood count:—

Total W. B. C. count 2900 per c.mm.

Hæmoglobin 45% (Sahli)

Serological test

Aldehyde test:—Positive.

Case No. 4.

Serum No. 4.

Name—Pagan Tudu 25 years, Santhal male.

Complaints—

Duration two and a half months.

- (1) Fever:—Intermittent type of temperature with chill.
- (2) Spleen:—Enlarged, three fingers breadth below the costal margin in the left nipple line.
- (3) Liver:—enlarge about $1\frac{1}{2}$ fingers below the costal margin in the right mid clavicular line.
- (4) Lungs:—A few crepetant rales in both the lungs.
- (5) Pigmentation:—Deeply pigmented skin all over the body.
- (6) Appetite:—Good.
- (7) Bleeding:—Epistaxis.
- (8) Oedema:—Oedema in both the legs and considerable amount of fluid in the Peritoneal cavity.

Blood count:—

Total W. B. C. count 6800 per c.mm.

Haemoglobin 45% (Sahli)

Serological test

Aldehyde test (Napiers) Positive.

Case No. 5

Serum No. 5

Name—Rabeka Hansdah 22 years, Santhal female.

Complaints—

Duration—three months.

- (1) Fever:—Intermittent pyrexia with chill.
- (2) Spleen:—Enlarged more than two fingers breadth below the costal margin in the left nipple line. Occasional pain.

- (3) Liver:—Enlarge one finger below the costal margin in the right mid-clavicular line.

- (4) Lungs:—Crepitant rales and some diminished breath sound in the right lung at the base.

- (5) Heart:—Slightly dilated. Soft systolic murmur in the mitral area present.

- (6) Pigmentation:—Deeply pigmented skin in the face, abdomen and extremities.

- (7) Slight oedema in both the legs and puffiness in the face

- (8) Appetite:—Not good

Blood count:—

Total W. B. C. count 3000 per c.mm.

Haemoglobin 30% (Sahli)

Serological test.

Aldehyde test: moderately strong positive.

Case No. 6

Serum No. 6

Name—Saraswati Ghatawalini, 7 years, Hindu female.

Complaints—

Duration eight months.

- (1) Fever:—Intermitent type.

- (2) Spleen:—Much enlarged, five fingers breadth below the costal margin in the left nipple line.

- (3) Liver:—Three fingers breadth below the costal margin in the right mid-clavicular line.

- (4) Appetite:—Good but gets intermitent attack of diarrhœa.

- (5) Pigmentation:—Gradual deep Pigmentation of the skin in the face and legs.

- (6) Bleeding:—Frequent bleeding from the gum.

- (7) Oedema:—Oedema in both the legs and slight ascites present.

Blood count:—

Total W. B. C. count 3000 per c.mm.

Haemoglobin 55% (Sahli)

Serological test

Aldehyde test—positive.

Case No. 7

Serum No. 7

Name—Fagu Hembrom—18 years—Santhal male.

Complaints—

Duration: Six months.

- (1) Fever:—Intermitent temperature.

- (2) Spleen:—Five fingers breadth below the costal margin in the left nipple line. Occasional pain.
- (3) Liver:—Two finger below the costal margin in the right mid-clavicular line.
- (4) Pigmentation:—Dusky looking skin over the face and abdomen.
- (5) Appetite:—Good but power of digestion is very poor. Loose stools.
- (6) Bleeding:—Occasional bleeding from the nose.

Blood count

Total W. B. C. count 3500 per c.mm.

Hæmoglobin 50% (Sahli)

Serological test

Aldehyde test:—Moderately strong positive.

Case No. 8

Serum No. 8

Name—Kunti Debi—60 years. Hindu female.

Complaints—

Duration:—Six months.

- (1) Fever:—Irregular low grade remittent type
- (2) Spleen:—Three fingers breadth below the costal margin in the left nipple line.
- (3) Liver:—One finger breadth below the costal margin in the right mid-clavicular line.
- (4) Lungs:—Crepitant rales in both the lungs at the base.
- (5) Pigmentation:—Deep Pigmentation over the skin in the face.
- (6) Bleeding:—Occasional bleeding from the gum and subcutaneous tissues
- (7) Oedema:—Some oedema in both legs.

Blood count

Total count W. B. C. count 3700 per c.mm.

Hæmoglobin 50% (Sahli)

Serological test

Aldehyde test Positive.

Case No. 9

Serum No. 9

Name—Sohidon Bibi—24 years, Mohammedan, Female.

Complaints—

Duration—6 (six) months.

- (1) Fever:—Periodic attack of Intermittent type of temperature.
- (2) Spleen:—Three fingers breadth below the left costal margin in the left nipple line.
- (3) Liver:—About one finger below the costal margin in the right mid-clavicular line.

(4) Heart:—Soft systolic murmur in the mitral area.

(5) Pigmentation:—Dusky skin in the face, abdomen and extremities.

(6) Appetite:—Good but poor digestion.

(7) Bleeding features:—Occasional bleeding from gum and nose.

(8) Oedema in both the legs.

Blood count

Total W. B. C. count 2700 per c.mm.

Hæmoglobin 32% (Shali)

Serological test

Aldehyde test—Positive.

Case No. 10.

Serum No. 10

Name—Indumoti Dasi—40 years, Hindu female.

Complaints:—

Duration—eight months.

- (1) Fever:—Periodic attacks of intermittent type of temperature.
- (2) Spleen:—Four fingers breadth below the costal margin in the left nipple line. Complains Occasional pain.
- (3) Liver:—About two fingers breadth below the costal margin in the mid-clavicular line.
- (4) Lungs:—Crepitant rales in both the lungs.
- (5) Pigmentation of the skin:—Dark skin all over the body specially in the face.
- (6) Appetite:—Good appetite but gets frequent loose stools occasionally.

Blood count:—

Total W. B. C. count 4400 per c.mm.

Hæmoglobin 50% (Sahli)

Serological test

Aldehyde test—Positive.

Case No. II

Serum No. II

Name—Umesh Jadopati, Hindu—male—30 years.

Complaints—

Duration—nine months.

- (1) Fever:—Periodic attack of malarial type of temperature with chill.
- (2) Spleen:—Progressive enlargement of the spleen five fingers breadth below the costal margin in the left nipple line.
- (3) Liver:—Two fingers breadth below the costal margin in the right mid-clavicular line.
- (4) Lungs:—Crepitant rales in both the lungs.
- (5) Pigmentation—Dark colour skin over the whole body.

(6) Appetite :—Appetite good but digestive capacity is very poor, gets diarrhoea frequently.

(7) Oedema :—Oedema in both the legs and abdomen.

(8) Bleeding—Occasional bleeding from the gum and nose.

Blood count:—

Total W. B. C. count 2700 per c.mm.

Hæmoglobin 30% (Sahli)

Serological test

Aldehyde test positive. (strongly)

Case No. 12.

Serum No. 12

Name—Kalu Murdi—Santhal; male—26 years.

Complaints—

Duration—five months.

(1) Fever :—Intermittent type of temperature.

(2) Spleen :—Three fingers breadth below the costal margin in the left nipple line.

(3) Liver :—Just palpable below the right costal margin.

(4) Lungs :—Moist rales at the base of both the lungs.

(5) Glands :—Few enlarged cervical glands.

(6) Pigmentation :—Dark skin in the face and arm.

(7) Appetite :—Not so good, power of digestion is poor.

(8) Bleeding :—Bleeding from the piles.

(9) Oedema :—Slight oedema in the legs.

Blood count—

Total W. B. C. count 2400 per c.mm.

Hæmoglobin percentrate 45%

Serological test

Aldehyde test positive. (strong)

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A CASE OF MEGACOLON

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MEGACOLON is a relatively rare condition appearing in childhood and characterised by obstinate constipation, dilatation of the colon and hypomotility of its wall. It was Von Ammon who first described megacolon in 1842, forty-five years before Hirschsprung, though the disease carries the name of the latter. Since then many aetiological factors have been considered, ranging from malnutrition to neurological disorder but for the last decade or so it is the neurogenic theory which has come to the forefront and now there remains little doubt that Hirschsprung's disease is due to dysfunction of the autonomic nervous system.

For a long time both sympathetic and parasympathetic nervous systems were thought to be acting as direct antagonists in the control of the bowel and defæcation. This led to the theory that megacolon was due to overaction of the sympathetic producing spasm of the pelvic sphincter. Different operations were devised by surgeons (Wad, Rankin and Learmonth & others) for removing the sympathetic supply with immediate good results. Intractable relapses with secondary complications of volvulus and even intestinal obstruction occurred, which raised doubts regarding the rôle of sympathetic. The inadequacy of the theory of sympathetic overaction was clearly shown when Denny-Brown and Robertson (1935) by their study of the changes in bowel activity after sympathetic denervation, proved that the mechanism which controls the evacuation of the bowel is mediated entirely through the parasympathetic, the sympathetic playing practically no part. Lannon & Weller (1947) presented evidence in favour of parasympathetic under-activity being the cause of megacolon. They also showed that the distal part of colon normally receives extensive parasympathetic supply. That the sympathetic does not contract the sphincter was shown by Jenkins (1948) from the observation that under low spinal anaesthesia, too low to involve the lumbar sympathetic, the sphincter relaxed.

The next important approach to the problem of etiology came from Swenson and A. H. Bill (1948) who by means of a special technique of slow injection of a small amount of barium enema solution, were able to demonstrate an area of spasm in the rectosigmoid junction.

Soon after Bodian, Stephens and Ward (1949) put forward a new conception of the causation of Hirschsprung's disease and a new method of treatment. This was based on detailed