Research

Kala-azar epidemic in Varanasi district, India

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Reports at the Sir Sunder Lal Hospital, Banaras Hindu University, of a large number of kala-azar cases from one particular village in Varanasi district, Uttar Pradesh, led us to carry out an epidemiological study of the situation using standard techniques. The overall prevalence and case fatality of the disease were 12.9% and 10.5%, respectively. A history of fever and hepatosplenomegaly was noted for all the cases. The case definition was the presence of parasites in bone marrow or splenic aspirate smears. The disease was more prevalent among adults, but occurred also among children. However, there was no clear linear relationship between the prevalence of the disease and age group. Kala-azar occurred among males and females, and its prevalence did not correlate significantly with income. Since the disease vector continues to be present in the study area, the health authorities should take strong steps to control the disease.

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Introduction

Leishmania spp., the etiological agent of kala-azar (leishmaniasis), was first recognized in India in 1903 (*1*). Kala-azar is still present in the country and remains endemic in eastern India, predominantly in Bihar State, where occasional epidemics occur (*2, 3*). In the last two decades, sporadic cases have been reported from the eastern districts of Uttar Pradesh (*4, 5*). In 1994, at the Sir Sunder Lal Hospital, Banaras Hindu University, Varanasi, which serves the health needs of the population in eastern Uttar Pradesh and Bihar State, an unusually large number of kala-azar patients were observed to have come from one particular village, Pandit Ka Purva, situated across the river Ganges in Varanasi district. We therefore carried out a study to discover the epidemiological characteristics of the kala-azar outbreak in that village.

Study area and methods

Varanasi district (total population, ca. 3.5 million) is situated on the plains of the Indo-Gangetic river belt and lies on both banks of the river Ganges. There are three distinct seasons (winter, summer, and monsoon). The soil is alluvial and the rural population is engaged mostly in agriculture; cattle and cattle sheds are very common. The region is also well known for the internationally important silk-weaving industry, and migrants from the adjoining states of Bihar, Madhya Pradesh and West Bengal have settled here for employment.

The rural study village of Pandit Ka Purva, situated 8 km from the Niyamtabad Community Development block in Varanasi district, had a population of 518. A door-to-door survey of all families in Pandit Ka Purva was carried out in November and December 1995, using a pre-designed and pre-tested proforma. Suspected cases of kala-azar were referred to the Sir Sunder Lal Hospital for parasitological confirmation of the diagnosis. The patients were also questioned about their movements between districts in the state in previous years.

Patients were considered to be suffering from kala-azar if they had had fever (for more than 2 months) and hepatosplenomegaly. The presence of parasites in splenic and bone marrow aspirates was confirmed by culture and Giemsa staining.

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Table 1. **Age distribution of kala-azar cases in Pandit Ka Purva village, Varanasi district, Uttar Pradesh, India**

Age group (years)[a]	No. of subjects surveyed	No. of cases[b]
<5	76	2 (2.6)
6–14	149	17 (11.4)
15–24	94	11 (11.7)
25–34	94	13 (13.8)
35–44	47	6 (12.8)
45–54	25	12 (48.0)
>55	33	6 (18.2)
All groups	**518**	**67 (12.9)**

[a] χ^2 test = 23.32, degree of freedom = 6, P <0.001.

[b] Figures in parentheses are the prevalence per 100.

Table 2. **Distribution of kala-azar cases, by sex and literacy status, Pandit Ka Purva village, Varanasi district, Uttar Pradesh, India**

Characteristic	*n*	No. of cases	Prevalence (per 100)	Z	*P*-value
Sex					
Male	266	39	14.7	1.21	> 0.05
Female	252	28	11.1		
Literacy					
Males					
Literate	56	5	8.9	1.59	> 0.05
Illiterate	210	34	16.2		
Females					
Literate	44	4	9.1	0.50	> 0.05
Illiterate	208	24	11.5		

Results

The findings of the door-to-door survey in Pandit Ka Purva village are given in Table 1. Of the total of 518 persons surveyed, 67 (39 males and 28 females) showed typical clinical and parasitological features of kala-azar, including 7 who died. The overall prevalence and case-fatality rate were 12.9% and 10.5%, respectively. Fever occurred mostly in September and October after the monsoon had ended. All the cases had a history of fever and splenomegaly and most had thrombocytopenia in the range 60 000–100 000 per mm^3. Leukocyte counts ranged between 4000 and 7000 per mm^3. None of the cases had lymphadenopathy.

All 67 patients were treated with sodium stibogluconate (20 mg per kg per day intravenously for 30 days) (data not shown); 60 (89.6%) of them improved and 7 (10.5%) died from concurrent infection or advanced disease. The age distribution of kala-azar cases showed significant differences, being highest among the 45–54-year age group, followed by those >55 years, and lowest in the age group <5 years (Table 1).

The prevalence of kala-azar was lower among literate persons, but the differences were not statistically significant (Table 2). The prevalence of the disease was highest among males whose primary occupation was in agriculture; a similar trend was observed among women who worked in agriculture and weaving (Table 3). The income of the study subjects did not vary markedly and the distribution of cases among different income categories was not statistically significant (Table 4).

Discussion

During the past few years, an increasing number of cases of kala-azar have been reported in various parts of India. Some of these could have been due to migration of cases from Bihar. The detection of a large number of clinically and parasitologically positive kala-azar cases in the present study may be due to a population influx from adjoining areas or to active disease transmission, or both. The reported annual incidence of kala-azar in India (ca. 20 000

Table 3. **Distribution of kala-azar cases, by sex and occupation, Pandit Ka Purva village, Uttar Pradesh, India**

Occupation	Males			Females			Total		
	No. surveyed	No. +ve	Prevalence (per 100)	No. surveyed	No. +ve	Prevalence (per 100)	No. surveyed	No. +ve	Prevalence (per 100)
Agriculture	19	8	42.1	18	4	22.2	37	12	32.4
Weaver	200	24	12.0	186	20	10.8	386	44	11.4
Small business	23	5	21.7	24	3	12.5	47	8	17.0
Service	20	1	5.0	19	1	5.3	39	2	5.1
Other (e.g. painter, rickshaw puller, mason)	4	1	25.0	5	0	0	9	1	11.1
Total	**266**	**39**	**14.7**	**252**	**28**	**11.1**	**518**	**67**	**12.9**

cases) may represent only a fraction of the real number. Since we found no evidence for population movements in the study village, the cases must have been due to a high level of disease transmission. Our survey showed that kala-azar was verging on epidemic proportions. The appearance of such an epidemic is serious because of the risk of spread to other areas of Uttar Pradesh.

We found a higher disease prevalence among adults, but children were also affected. Rai & Sehgal (*4*) reported leishmaniasis cases among all age groups, including under-1-year-olds, but the majority of their cases were in children and young adults (aged 5–30 years). No direct relationship between the occurrence of kala-azar and age group was observed, but the higher prevalence among males may be due to the greater exposure of men to the vector, because of their clothing and habits. The occurrence of fewer cases among literate persons may be related to their use of protective measures, such as mosquito nets. The distributions of the disease by occupation and income in the study area were similar to the findings reported by Rai & Sehgal (*4*).

The disease vector of kala-azar (female *Phlebotomus argentipes*) occurs in large numbers in the alluvial plains of Uttar Pradesh. In view of the outbreak of kala-azar in Pandit Ka Purva, it is essential for the health authorities to take immediate measures to control the epidemic and prevent its spread to neighbouring villages. The control of kala-azar ultimately rests on the development of much shorter treatment courses, greatly improved diagnostic methods, and close cooperation between universities, public health agencies, and the government. ■

Table 4. **Distribution of kala-azar cases, by monthly per capita income, Pandit Ka Purva village, Uttar Pradesh, India**

Monthly income (Rs)[a]	No. surveyed	No. positive for kala-azar	Prevalence (per 100)
100–200	148	19	12.8
201–300	230	32	13.9
301–400	90	11	12.2
>400	50	5	10
Total	**518**	**67**	**12.9**

[a] χ^2 test = 1.1051, degree of freedom = 3, $P > 0.05$.

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Résumé

Epidémie de kala-azar dans le district de Bénarès (Inde)

Ayant eu connaissance, par le Sir Sunder Lal Hospital (Université Banaras Hindu), de l'existence de nombreux cas de kala-azar dans un village du district de Bénarès (Etat de l'Uttar Pradesh), nous avons entrepris une étude épidémiologique en utilisant les méthodes habituelles. La prévalence globale et le taux de létalité de la maladie se situaient respectivement à 12,9 et 10,5%. On a relevé des antécédents de fièvre et d'hépatosplénomégalie chez tous les malades. Les cas ont été définis par la présence de parasites dans des frottis de moelle osseuse et de biopsies spléniques. La maladie a surtout frappé les adultes, mais des enfants ont également été atteints. On n'a toutefois pas constaté de relation linéaire nette entre la prévalence de la maladie et la classe d'âge. Le kala-azar a sévi parmi des sujets illettrés de sexe masculin, mais il n'y avait pas de corrélation significative avec le niveau de revenu. Comme le vecteur est toujours présent dans la zone étudiée, il convient que les autorités sanitaires prennent des mesures rigoureuses pour circonscrire la maladie.

Resumen

Epidemia de kala-azar en el distrito de Varanasi (India)

En el Hospital Sir Sunder Lal, de la Universidad Hindú de Banaras, se detectó un elevado número de casos de kala-azar procedentes de Uttar Pradesh, aldea del distrito de Varanasi. Ese hecho nos llevó a realizar un estudio epidemiológico de la situación mediante técnicas normalizadas. La prevalencia global y la tasa de letalidad eran del 12.9% y el 10.5%, respectivamente. En todos los casos existía una historia de fiebre y hepatoesplenomegalia. Los casos se definían por la presencia de parásitos en los frotis de los aspirados de médula ósea o de bazo. La enfermedad era más frecuente en los adultos, pero se daba también entre los niños. Sin embargo, no existía una relación lineal clara entre la prevalencia de la enfermedad y el grupo de edad. El kala-azar afectaba sobre todo a varones y a personas analfabetas, pero no se observó una correlación significativa entre su prevalencia y los ingresos. Dado que el vector de la enfermedad no ha desaparecido de la zona estudiada, las autoridades sanitarias deberían tomar medidas enérgicas para combatir esa dolencia.

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