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Outbreak Of Smallpox In Some Villages Of Jaipur District, Rajasthan, During 1968

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During November 1968, there was an outbreak of smallpox epidemic in some villages of Jaipur district of Rajasthan State. The investigation of the epidemic revealed the role of Nomads in the causation of the outbreak. The immunization status of the community in relation to the primary vaccination was poor. Some of the Nomads who had attack of smallpox were responsible for the outbreak in the villages. All the cases investigated in the villages were indigenous. But in the initial phase of the epidemic, one or two cases occurred and after an interval of 2 to 3 weeks the epidemic broke out. Had control measures been undertaken when the initial cases were reported, the epidemic would have been averted. The authors have compared several instances of such behaviour of the epidemic pattern and have pleaded for active and passive surveillance over the smallpox cases for eradication of smallpox. The authors have pleaded that the surveillance organization will also improve the effective immunization in addition to the surveillance over the cases.

Introduction

During November, 1968 there was a report of an outbreak of smallpox epidemic in some villages of Jaipur District of Rajasthan. This epidemic was investigated by a team from National Institute of Communicable Diseases. The present communication deals with the results of the investigation(s).

Area and topography : The villages of Saiwara and Nathawala, which are located at a distance of about 45 miles and 42 miles from Jaipur city were affected with smallpox epidemic. Both the villages are in the block Shahpur (**vide** Map). Saiwara village has a population of 2,100 and Nathawala village has a population of 980 including the hamlets. Both the villages could be approached by metallic road. There is one allopathic dispensary in Saiwara village. The sanitation in both the villages is poor. There is no drainage system and the water-supply is from draw-wells.

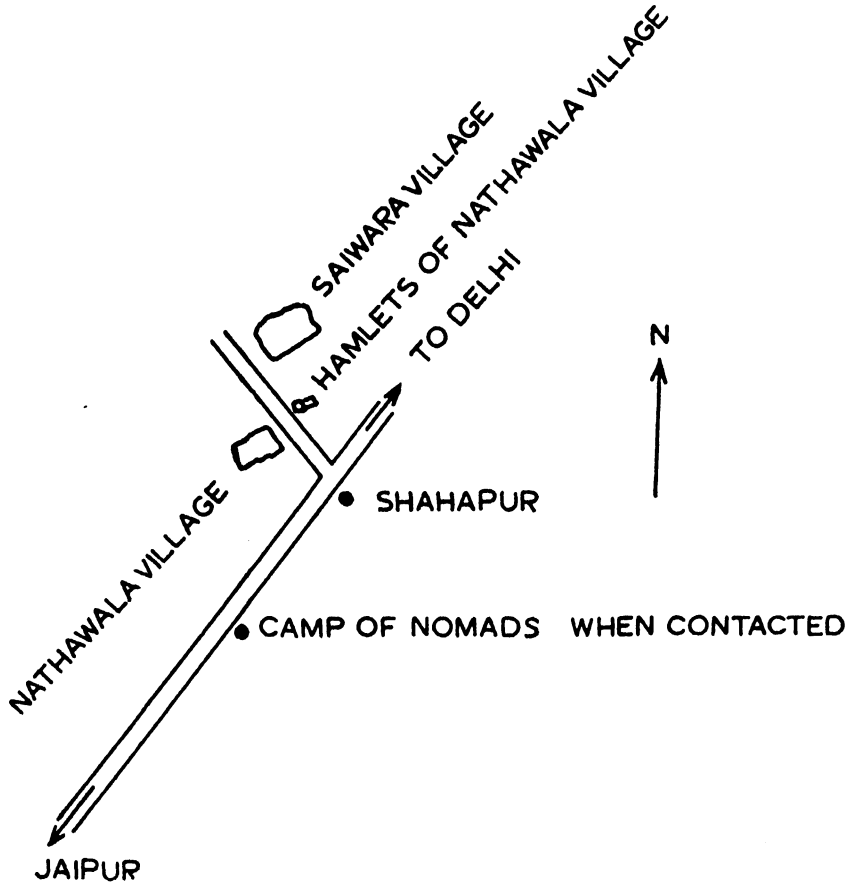
Health organization with reference to the National Smallpox Eradication Programme : The villages were covered under the National Smallpox Eradication Programme. The planning of the programme and its execution is as follows :—

The work under National Smallpox Eradication Programme was started in the

State on January, 1963. By May 1964 all the districts of the State were covered under the programme.

Map

Sketch Map showing the location of the Saiwara and Nathawala villages, Rajasthan



The programme was re-organized with effect from 1st June 1966, under which the staff of the programme has been attached to the District Health Officers/Health Officers and the local National Smallpox Eradication Programme units were merged with the existing District Health Organization.

Five epidemic squads have been formed and provided at each Divisional Headquarters to strengthen the machinery for taking prompt and active control measures in case smallpox outbreak is reported in the area.

The organization at the Primary Health Centre, Amarsar, in whose jurisdiction are the two villages reporting smallpox cases, is located about 8 miles from the Saiwara

village. Under the Medical Officer of the Primary Health Centre Amarsar is one Sanitary Inspector to supervise the smallpox work and two vaccinators to carry out the vaccinations. Each vaccinator covers about 40,000 population. The Headquarter of the Vaccinator responsible for vaccination work in these two villages is at Shahpura which is about 5 miles from Saiwara. Up to the end of September, 1968 the Basic Health Worker was responsible for vaccination work in the villages Saiwara and Nathawala. One Lady Health Visitor at the P.H.C. Headquarter, 3 Auxillary Health Workers, and 3 Auxillary Nurse Midwives at each Sub-centre of the PHC also help in the vaccination work. In case of smallpox outbreak the Medical Officer incharge dispensary at Saiwara is also supposed to notify the cases and take control measures.

Freeze dried smallpox vaccine is sent to the Primary Health Centre every fortnightly by post according to the requirements. In case of emergency it is obtained by special messenger. The vaccine is stored in refrigerators at the Primary Health Centres and issued to the Vaccinators who keep these in thermos bottles. Rotary Lancet method is used for vaccination. The vaccinators are given training for 4 weeks at Jaipur.

System of notification and organization for combating epidemics :

(*i*) Parents inform the Panchayat Sarpanch or other members of the Panchayat of the village who inform the Medical Officer of the Primary Health Centre.

(*ii*) There is also a provision that the Gram Panchayat should inform about the occurrence of the disease to Block Development Officer who informs the appropriate Primary Health Centre

(*iii*) Pink coloured notification cards have been supplied to the Health Workers in rural areas to promptly notify smallpox case by post directly to the District Health Officer.

Recording and protection of transient and migrating population : Each Vaccinator is supposed to keep a separate record of all kinds of transient and migrating population and vaccinates all the members when he comes across such population. He issues a certificate of having vaccinated the members to the head of the group.

Incidence of smallpox in the previous years : No records were available to ascertain the incidence of smallpox and vaccination carried out in these two villages during the previous years. However, during 1968, there were 268 cases of smallpox reported in the districts and 5·5% and 26·8% of the population in the district were given primary and revaccination respectively.

History of the outbreak in Saiwara village : During the middle of November 1968, a party of 'Gaudion Luhar' from Sikar district arrived at Saiwar and camped in the village in front of the Government dispensary. 'Gaudion Luhar' belong to Nomadic tribes and their profession is to make tools for agricultural purposes for the villagers. They move from village to village in bullock carts. On an average they camp in a village about 3-4 weeks. There were two cases of smallpox among the party of the 'Gaudion Luhars'.

They stayed in the village for 8 days and then they had to leave on demand from the villagers.

According to the official report, the first case was reported on 18-12-68. Thirteen cases and five deaths were notified till the period of investigation.

A house-to-house survey was done of the village to detect the cases and the information was recorded on a proforma. In total, forty cases with eight deaths were detected. The age, sex vaccination status of the cases and deaths are given in Table I.

The vaccination status of deceased persons was collected by history and those of surviving cases by personal verification.

Of the 37 cases for which the vaccination status was known, 26 cases (70·3%) were unvaccinated and 3 were vaccinated only during the incubation period of the disease, i.e. 78·4% were not vaccinated before they got the infection. Eight (21·6%) had received primary vaccination from 2 to 30 years back. The vaccination status of 3 cases could not be ascertained. Fourteen cases (35·0%) were males and 26 cases (65·0%) were females. The case fatality rate among the unvaccinated was (including 3 children vaccinated during the incubation period) 20·7% and among those who had primary vaccination 12·5%. Maximum cases (65%) were in the age group 1 to 5 years. Overall case fatality rate was 20%.

The first case detected was on 21st November, 1968. The weekly dates of onset of fever of cases are mentioned below (Table II).

In 24 affected families there was a single case only in each family, in 6 affected families there were 2 cases each, and in one family there were 4 cases. All the cases were indigenous.

Out of 40 cases only 13 cases had been notified, i.e. 32·5% of cases had been notified. The interval between the occurrence of 1st case (in the village) and notification was about four weeks. On notification 37 primary vaccinations and 121 revaccinations were carried out from 18-12-68 to 21-12-68. Again from 9-1-69 to 19-1-69, 252 primary vaccinations and 948 revaccinations had been done.

To assess the vaccination status of the population a scar survey of the persons available in the houses in the village at the time of visit was carried out. Out of the total population of the village 2100, only 782 persons (37·2%) could be examined for scar survey. The results of the survey are given in Table III.

Of the children surveyed up to 14 years (488 children) 8·2% had pock marks and 3·7% had no scars of vaccination or pock marks. Among all age groups 5·6% had no scars of vaccination or pock marks.

Outbreak in the Nathawala village : According to the official figure, four cases with no death had been reported. The onset of the first case reported was on 25-12-68.

Table I. **Analysis of smallpox cases and deaths according to age, sex and vaccination status, village Saiwar, Distt. Jaipur (Rajasthan) during November, 1969**

Vaccination status	Below 1 year						1—5 years						6—14 years						15 years and above						All ages								
	Cases			Deaths			Cases			Deaths			Cases			Deaths			Cases			Deaths			Cases			Deaths			C. F. R.		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Unvaccinated	0	1	1	0	0	0	9	10	19	2	3	5	0	6	6	0	1	1	0	0	0	0	0	0	9	17	26	2	4	6	22·2	23·5	23·07
Primary vaccination	0	0	0	0	0	0	0	3	3	0	1	1	1	3	4	0	0	0	0	1	1	0	0	0	1	7	8	0	1	1	0	14·3	12·5
Vaccination during inoculation period	0	0	0	0	0	0	2	0	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	1	1.	2	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1	2	3	0	1	1	0	50·0	33·3
Total ..	0	1	1	0	0	0	12	14	26	2	5	7	2	10	12	0	1	1	0	1	1	0	0	0	14	26	40	2	6	8	14·3	23·1	20·1

C. F. R. = Case Fatality Rate M = Male F = Female T = Total

Table II. **Weekly onset (of fever) of smallpox cases in Saiwara village in Rajasthan State 17th November, 1968 to 25th January, 1969**

Dates	No. of cases
1st week (17/11—23/11/68)	1
2nd week (24/11—30/11)	1
3rd week (1/12—7/12)	..
4th week (8/12—14/12)	..
5th week (15/12—21/12)	7
6th week (22/12—28/12)	7
7th week (29/12—4/1/69)	9
8th week (5/ 1—11/1)	7
9th week (12/ 1—18/1)	6
10th week (19/ 1—25/1)	2
Total ..	40

Table III. Smallpox Scar Survey in village Saiwara, Distt. Jaipur January 22, 1969*

Age group	Percentage of total			
	Pock marks (with or without vacc. scar) (P)	Vaccination scar present (X)	Doubtful (?)	No scars of vaccination or pock marks
Below 1 year	1·6	85·7	1·6	11·1
1—5 years	5·9	88·5	1·2	4·2
6—14 years	11·3	86·7	0·4	1·5
Up to 14 years	8·2	87·3	0·82	3·7
15 years and above	11·6	73·8	5·8	8·8
(All age groups) Total ..	9·5	82·2	2·7	5·6

*This includes some of the population who were given primary vaccination between 18-12-68 and 19-1-69

A house-to-house survey was done to detect the smallpox cases. Twelve cases with 3 deaths were detected. The age, sex, vaccination status of the cases and deaths are given in Table IV. Out of 12 cases, 10 (83·3%) were not vaccinated. One was vaccinated during the incubation period. Thus eleven cases (91·7%) had not received any vaccination at the time they got infected. Only one case had been vaccinated. This case had received primary vaccination nine years back and had been revaccinated during the incubation period only. All the cases were within 14 years of age.

There were three deaths out of the 12 cases, i.e. the case fatality rate was 25%. Two were never vaccinated and one had received vaccination during incubation period only. Two deaths were in the age group 1 to 5 years and 1 in the age group 6 to 14 years.

The weekly dates of onset of the cases were as following (Table V).

All the cases were indigenous.

One family had one case, four families had two cases each and one family had three cases.

Four cases out of 12 were notified, i.e. 33·3% the cases had been notified.

During 18-12-68 to 21-12-68, 22 primary vaccinations and 16 revaccinations were done, and from 9-1-69 to 19-1-69, 105 primary vaccinations and 307 revaccinations were done.

To assess the vaccination status of the population a scar survey of persons available in the houses in the village at the time of visit was carried out. Of the total population of 980, only 337 could be examined for scar survey. The result of the survey is given in Table VI.

Table IV. Analysis of smallpox cases and deaths according to age, sex and vaccination status—village Nathawala Distt. Jaipur (Rajasthan)

Vaccination status	Below 1 year						1—5 years						6—14 years						15 years and above						All ages						
	Cases			Deaths			Cases			Deaths			Cases			Deaths			Cases			Deaths			Cases			Deaths			C. F. R.
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Unvaccinated	1	0	1	0	0	0	1	4	5	1	0	1	0	4	4	0	1	1	0	0	0	0	0	0	2	8	10	1	1	2	20·0
Primary vaccination only	0	0	0	0	0	0	0	0	0	0	0	0	0	1*	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Vaccination during incubation period	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	100%
Total ..	1	0	1	0	0	0	1	5	6	1	1	2	0	5	5	0	1	1	0	0	0	0	0	0	2	10	12	1	2	3	25·0

C. F. R. = Case Fatality Rate M = Male F = Female T = Total

*Revaccinated during I.P. (Incubation period)

Table V. Weekly onset (of fevers) of smallpox cases in Nathawala village in Rajasthan State 17th November 1968 to 25th January, 1969

Dates	No. of cases
1st week (17/11—23/11/68)	..
2nd week (24/11—30/11)	..
3rd week (1/12—7/12)	1
4th week (8/12—14/12)	..
5th week (15/12—21/12)	..
6th week (22/12—28/12)	2
7th week (29/12—4/1/69)	4
8th week (5/1—11/1/69)	3
9th week (12/1—18/1)	2
Total ..	12

Table VI. Smallpox scar survey in village Nathawala, Distt. Jaipur, January 22, 1969*

Age group	Percentage of total			
	Pock marks (with or without vaccination scar) (P)	Vaccination scar present (X)	Doubtful (?)	No scars of vaccination or pock marks
Below 1 year	0·0	61·9	0·0	38·1
1—5 years	0·0	77·0	0·0	23·0
6—14 years	3·0	95·0	0·0	2·0
Up to 14 years	1·5	84·6	0·0	13·9
15 years and above	2·8	87·4	0·0	9·8

*This includes some of the population who were given primary vaccination between 18-12-68 and 19-1-69

Of the children surveyed up to 14 years (195 children) 1·5% had pockmarks and 13·9% had no scars of vaccination or pock marks. Among all age groups 12·2% had no scar of vaccination or pock marks.

Discussion

In view of delayed reporting of notifiable diseases, most of the epidemics are investigated long after the epidemic has subsided. But the present investigations were carried out, about the time when the epidemic had just subsided, thereby the history of the epidemic was recorded with adequate satisfaction.

The vaccination status in the two villages investigated were inadequate as evidenced by the fact that 289 and 127 primary vaccinations were performed between 18-12-68 and 19-1-69 in a population of 2,100 and 980 respectively.

The nomads are quite often a problem in the eradication of some communicable diseases. But the nomads of the type (Gaudian Luhars) are of great danger, as their profession brings them very close to village population particularly where the vaccination status of the community is low.

Thirty nine of the cases were below 14 years of age and 78·4% of the cases were not vaccinated which indicates poor coverage of the population with primary vaccination prior to the onset of the epidemic. Incidence of smallpox in both the villages was more amongst the females (Table I and IV).

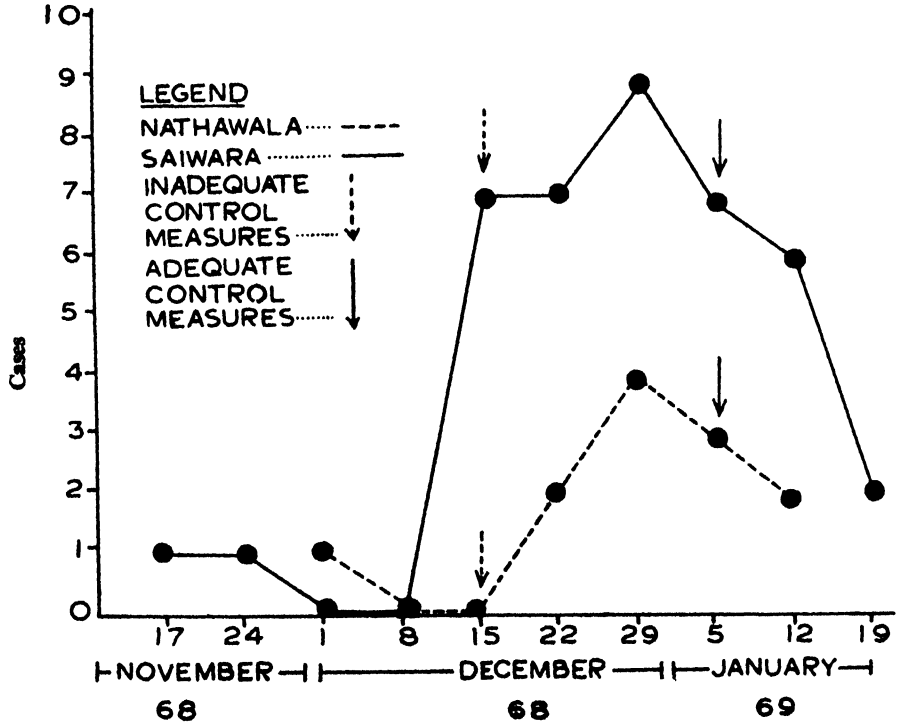
The movement of the epidemic from one village to the other has followed according to the movement of the *Gaudian Luhars*. In course of the epidemic investigation a search was made to locate the *Gaudian Luhars* and they were traced on an open on the main road side between Jaipur and Shahapur away from the village. As they were chased out of the two villages, for some time they had prepared to camp in open space. But villagers were coming to them for getting tools for agricultural purposes. For such purposes mostly adults and older population used to come to them. The chances of younger susceptible population coming to them was remote. Therefore, it is presumed that other villages in their course of journey of 20 miles were not affected.

The party of nomads consisting of about 45, when contacted, had no frank case of smallpox but two had recent scars of smallpox. None of them had any vaccination scar mark, but except few, remaining had old smallpox scar mark.

From Graph 1, it would be observed that inadequate control measures had no effect over the epidemic pattern, whereas intensive measures when instituted brought down the epidemic.

Graph 1

Weekly onset (of fever) of smallpox cases Nathawala and Saiwara villages, Rajasthan, 17th November to 25th January 1969

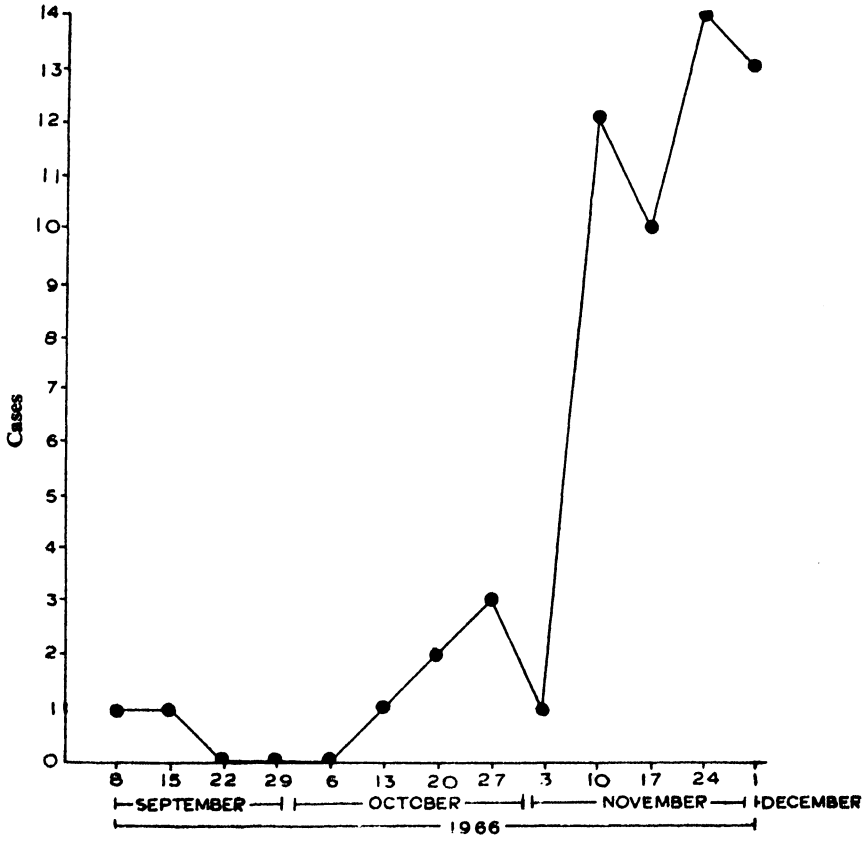


In both the villages cases were indigenous, but from Graph 1 it will be observed that initially one or two cases occurred and after 2-3 weeks time large numbers of cases occurred. Similar observations were noted by Pattanayak **et al** (1966) while evaluating the National Smallpox Eradication Programme in Darbhanga district of Bihar State. From Graph 2 it will be observed that 2 cases occurred in the initial stage in the village Chaksaho and after the interval of 3 weeks large number of cases occurred. The control measures were instituted 10 weeks after the outbreak of the epidemic. Bagar **et al** (1967*) had also observed similar pattern of the epidemic (Graph 3). The first case remained undetected and 2 weeks after large number of cases occurred.

* The data have been reproduced in the graph with the kind permission of the Editor, Ind. Soc. Mal. & other Communicable Diseases.

Graph 2

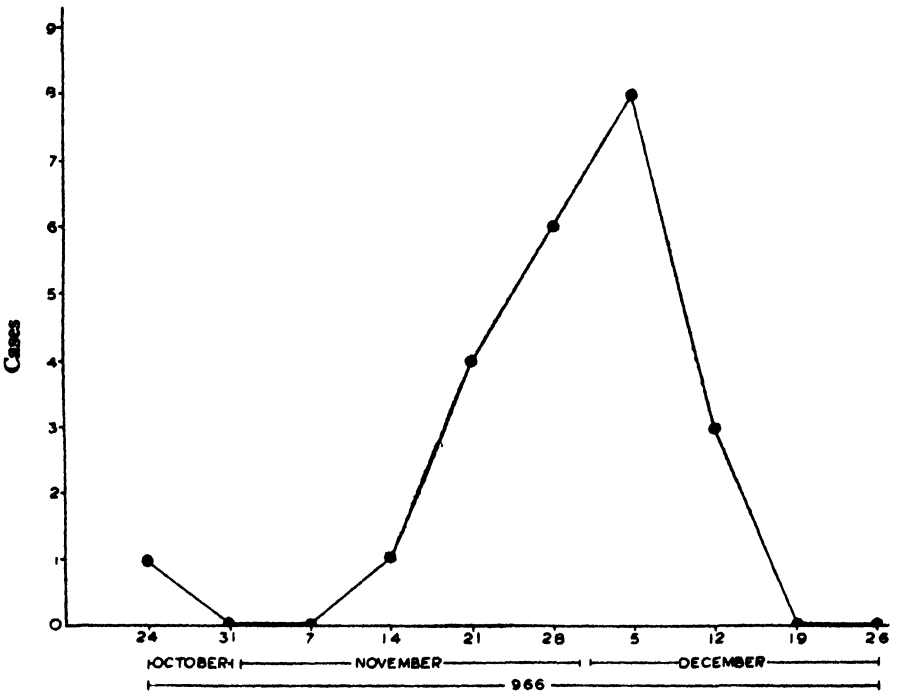
Weekly smallpox cases in village Chaksaho under Patoria block, Darbhanga Distt. Bihar September, 1966 to December, 1966



Had the earlier cases in all these observations been notified and appropriate control measures instituted immediately then it is likely that the epidemic could have been averted or intensity would have been low. In all the observations, stated above, control measures were initiated after the episode had reached the peak of the epidemic curve. The role of active or passive detection of smallpox cases is of immense value in the eradication of smallpox. Although there were three recommended methods for notification of smallpox cases in the villages which were investigated but 32·5% of cases were notified in Saiwara village and 33·3% of cases were notified in Nathawala village. As the existing notification system has not yielded the desired effect, there is an urgent need for surveillance over the disease which consists of prompt smallpox case detection, reporting, epidemiological investigation, cross notification and immediate institution of containment measures which not only help in averting the epidemics but also in effective coverage with vaccination.

Graph 3

Weekly distribution of smallpox cases, onset of fever, eruption and hospitalization in Hauz Khas



In developing countries funds are not easily available for taking up well knitted and intensive surveillance system, nor basic health services are developed enough to undertake this responsibility. There are risks that multi-purpose programmes might hamper the main cause of the programme where basic services are inadequate. Therefore, it is felt that to start with the surveillance over smallpox could be of the nature of reporting of cases. India is a country of agro-economy, where about 80% of the population remain in the villages. The surveillance should therefore be more intensified in this population.

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