

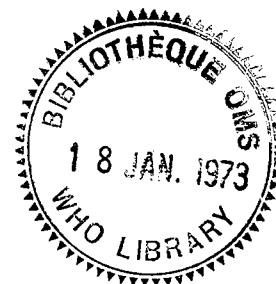
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PROBLEMS OF SMALLPOX DIAGNOSIS

by

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It has been stressed that in areas where smallpox transmission has been virtually interrupted, every suspect case is to be considered as an emergency and a correct diagnosis must be established and confirmed by means of clinical examination, epidemiological investigation and laboratory testing. A joint assessment of the smallpox eradication programme in Kerala State was carried out by the WHO Medical Officer, Dr I. Arita, along with the writer, as the Programme Officer. The assessment has pin-pointed the importance of establishing the correct diagnosis of suspect smallpox cases. It also throws much light on the problem of intensification of surveillance activities in an area where smallpox transmission has been interrupted since 1968 and where every suspect case has to be confirmed at the highest level by the appropriate methods of confirmation. The situation is slightly different from countries which have eradicated smallpox because being a particular region of a huge sub-continent like India where smallpox in an intensive form is still prevalent, the danger of importation at short notice is always present, especially because of the absence of inter-State visa regulations. The surveillance component in detection of smallpox hence assumes paramount importance. This in turn is dependent on the efficacy of the reporting system and the technical training and efficiency of the surveillance team. Kerala State, with 100 percent qualified health staff in position in all the health posts, is in a comfortable position in this respect, compared to many other States in India, where a dearth of qualified health staff to man the requisite posts is the bane of the health service. But the main problem facing the State is inadequate supervision of field staff especially at the District level and at lower levels (i.e. up to the Block/Primary Health Centre level). This could be ensured only by the appointment of supervisory personnel/administrators, trained/qualified in public health, and with regular in-service training/Staff College training, according to their level of appointment.

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Problems in smallpox diagnosis become complicated when we are confronted with conflicting and unusual epidemiological findings in the field. We know that 90 percent of smallpox cases occur in those who have never been vaccinated against smallpox, that a majority of such cases occur in unvaccinated children under 5 years of age and that the highest number of deaths due to the disease is recorded in this age group. Any other epidemiological information to the contrary, as for example a majority of the cases being found in vaccinated persons above the age of 15 years and with deaths occurring mainly in the 40 year group and above, immediately arouses a suspicion as to the authenticity of the finding, based on laboratory confirmation alone. This was what confused the issue in the diagnosis of smallpox in Kerala State where the following findings were recorded by the assessment team in February 1972.

Smallpox cases recorded in 1971

1. The State recorded 108 cases of 'smallpox' in 1971. With the exception of 6 cases, all the 'cases' occurred during the period from January 1971 to March 1971. In view of the smallpox-free status in Tamil Nadu as well as the adjacent border areas of Mysore and Andhra Pradesh in 1971, the occurrence of 108 'cases' in Kerala State seemed to indicate the presence of persistent smallpox endemic foci in Kerala State. Further, these 108 cases were distributed in the 10 districts of the State which would suggest that endemic foci areas would be covering wide areas of the State.
2. On the other hand, the statistical review of available records on such cases revealed that 100 percent of the cases had been successfully vaccinated against smallpox infection.
3. Seventy percent of cases occurred in the age groups of 15 years and above.
4. Out of the 108 cases of 'smallpox', 20 deaths were recorded. Of these, 17 occurred in the age group of 40 years and above.

These observations indicated that such epidemiological findings were quite unusual, if they were actually smallpox cases, as previously mentioned.

Field visits and observation of the above cases revealed that all the above cases had history of contact with chickenpox patients in the same household, hospital or school. An important fact was that the source of infection was traced back to typical chickenpox outbreaks. This is contrary to what is expected in smallpox endemic areas. In addition to this epidemiological field finding, discussions with project staff at District and Primary Health Centre level revealed that the surviving cases presented a clinical picture typical of chickenpox.

The above findings strongly indicated that the cases recorded in 1971 in the State were NOT smallpox but chickenpox or other vesicular disease, if any.

It is to be noted that at the time, many cases had been confirmed by laboratory testings. However, subsequent review with the laboratory concerned (Microbiology Department, Calicut Medical College) revealed that lesions produced on choriallantoic membrane of chick embryo for purpose of virus isolation (the conclusive test done for detection of smallpox infection, on basis of scab specimens obtained from patients) were different from produced by variola virus. Therefore the nature of such isolates certainly required further study and it was considered realistic not to take into consideration the testing result of the laboratory regarding cases recorded in 1971. In fact, after recognition of these non-variola lesions all the subsequent results published from the laboratory turned out to be negative for smallpox.

Deaths occurring in complications as viral pneumonia mostly in vaccinated adults in chickenpox cases are liable to be mistaken as due to smallpox. All such cases investigated had without exception a history of contact with chickenpox before the onset of the vesicular disease. Further, many household members who were family contacts of the fatal cases developed typical chickenpox. This is against all accepted precepts of epidemiological thinking on the signs, symptoms, source of origin and contact cases of the disease according to which a smallpox case must have had a previous source of infection which was typically smallpox and all contact cases must produce smallpox only and not chickenpox. So the clinical diagnosis along with source investigation and case finding in all suspected cases of smallpox is as important if not more important than a laboratory confirmation. A positive laboratory confirmation cannot alone be relied upon as a conclusive evidence of smallpox infection, as the laboratory finding may not always be relied upon unless confirmed by cross testing of the same specimen in other laboratories. In the particular instance regarding erroneous laboratory reporting this has been amply proved by cross testing in a Madras laboratory of the same specimens, declared as negative for smallpox virus in CAM, and also corroborated by other international laboratories where the tests were arranged at WHO level.

On the above findings, it was concluded that smallpox transmission has been virtually interrupted in the State from as early as 1968.

Use of laboratory diagnosis in smallpox detection

Previous instruction to collect specimens from severe chickenpox cases were ordered to be discontinued after the assessment team's visit in February 1972.

It was instructed that specimens were to be taken only when the possibility of smallpox could not be excluded after clinical and epidemiological investigation. The Assistant District Medical Officer of Health is asked to take principal responsibility as to whether or not a specimen should be taken from any suspected case. In all clinically confirmed cases, from whom specimens are taken for laboratory examination, duplicated specimens are instructed to be taken. The specimens are to be sent by the Assistant District Medical Officer

of Health to the Microbiology Department, Calicut Medical College (Kerala) with a copy of the investigation schedule of the case and also with intimation to the Assistant Director of Health Services (Smallpox) of the State Headquarters. The other duplicate specimen taken from the case is to be kept under refrigeration at District level. Utmost attention is to be paid to avoid contamination of any other article when the specimen is being stored.

The laboratory will report the results of testing to the Assistant District Medical Officers of Health with a copy to the Assistant Director of Health Services (NSEP). The interpretation of the laboratory report should be carefully made by the Assistant District Medical Officers of Health and the Assistant Director of Health Services (NSEP) as indicated below:-

1. If results are negative for smallpox, there are three possibilities. Firstly, the specimen did not contain smallpox virus; secondly, the quality of the specimen was not satisfactory for the laboratory to isolate the smallpox virus, and thirdly, the laboratory technique was not sensitive enough to recover the virus. Therefore, if the clinical and epidemiological observation strongly suggests smallpox infection, the patient should be treated as a case of smallpox.
2. If the laboratory results are negative, the other specimen which has been kept at District Office should be sent through Assistant Director of Health Services (NSEP) to Dr Sarkar's Microbiology Laboratory, Calcutta, for further confirmation of diagnosis.

It is to be noted that false positive results of specimens examined at the laboratory may occur even in an experienced laboratory. In consideration of the experience of such false positive results in 1971, in Kerala, it would be appropriate to conduct two laboratory testings at two different laboratories and determine the diagnosis.

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