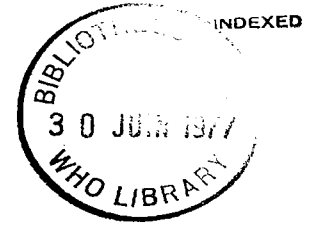




PROBLEM OF PERSISTENCE OF FACIAL POCK MARKS  
AMONG SMALLPOX PATIENTS

by

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1. INTRODUCTION

Surveys of the prevalence of facial pock marks have been used in a number of smallpox endemic areas to estimate the actual incidence of smallpox, to evaluate reporting efficiency or to provide additional information on the history of smallpox transmission in the observed geographical areas or even in an important sector of the general population.

The methods used required physical examination, in places combined with proper epidemiological interviewing, of the youngest age-groups or of the whole cross-section of the general population. In addition to the important correction factors for the observed rate of mortality, age distribution of cases and deaths among other factors, and the loss of facial pock marks over a period of time, come significantly into account in such studies.

In order to determine specifically for India the frequency of the retention of residual facial pock marks in previously identified smallpox cases, a survey was undertaken as a part of the organized epidemiological reinvestigation of smallpox outbreaks detected since 1975 in India.

2. MATERIAL AND METHODS

An organized epidemiological reinvestigation of 339 smallpox outbreaks detected since 1 January 1975 was carried out at the end of 1976. Besides other activities, all known affected households were identified, and the line-listing of known cases rechecked and re-evaluated. The identified smallpox cases were carefully interviewed and then physically checked for residual facial pock marks.

Residual facial scars were calculated and results recorded on a standard form. Results of these examinations carried out in 280 outbreaks, i.e. those where a diagnosis of smallpox had been confirmed by laboratory testing and where patients were examined by an experienced Medical Officer, usually the leader of a surveillance team, have been reported in this study. Table 1 gives the age distribution and vaccination status of the persons examined.

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TABLE 1. AGE DISTRIBUTION AND VACCINATION STATUS OF PERSONS EXAMINED

Age-group	Vaccination status		Total	
	Vaccination scar		Number	Percentage
	Present*	Absent		
0-4	54	47	101	21.8
5-14	85	134	219	47.2
15-24	23	25	48	10.3
25-54	71	17	88	18.9
55+	7	1	8	1.8
Total	240	224	464	100.0

\* Cases vaccinated during the incubation period in 1975 included.

The examination of smallpox patients was carried out from 18 to 24 months after the attack occurred.

### 3. RESULTS

Of the total of 464 patients examined, approximately 48% were females and 52% were males. Two hundred and forty individuals were found to have distinct vaccination scars and the remaining 224 showed no sign of a vaccination scar.

In all, out of the 464 people examined, 76 (i.e. 16.4%) had no residual facial pock marks at all and on the faces of 42 (9.0%) only one to four deeper scars could be discovered. The remaining 346 examined (i.e. 74.6%) had five or more residual visible scars resulting from smallpox.

It was found that the proportion of those left with residual facial pock marks varies according to the vaccination status of the patients. The sample examined was therefore also divided according to vaccination status. Table 2 shows the distribution of facial pock marks among unvaccinated smallpox patients further subdivided according to age-group.

TABLE 2. DISTRIBUTION OF FACIAL POCK MARKS AMONG UNVACCINATED PERSONS BY AGE

Age-group	Total number	Patients without visible vaccination scar				
		Number of facial pock marks				
		0	1-4	5-9	10-24	25+
0-4	47	11	5	8	9	14
5-14	134	9	5	15	28	77
15-24	25	2	-	3	4	16
25-54	17	1	-	1	3	12
55+	1	-	-	-	-	1
Total	224	23	10	27	44	120

Of the total of 224 persons examined in this category, there were only 23 persons (i.e. 10.2%) having no residual facial pock marks at all and 10 persons (i.e. 4.5%) having from one to four scars on their face. The rest of 191 patients examined showed five or more residual smallpox scars on the face, 120 of them (53.6%) having from 25 to an uncountable number of scars. The highest proportion (i.e. 23.4%) of those not having facial scars at all was found among the youngest children in the age-group 0-4. Thereafter the proportion of those without residual facial scars showed a decreasing trend with age.

Similarly Table 3 shows the distribution of facial pock marks among those with a visible vaccination scar.

TABLE 3. DISTRIBUTION OF FACIAL POCK MARKS  
AMONG VACCINATED PERSONS BY AGE

Age-group	Total number	Patients with visible vaccination scar				
		Number of facial pock marks				
		0	1-4	5-9	10-24	25+
0-4	54	22	7	12	6	7
5-14	85	15	9	16	15	30
15-24	23	3	5	3	5	7
25-54	71	13	11	12	11	24
55+	7	-	-	1	3	3
Total	240	53	32	44	40	71

Of the total of 240 persons vaccinated in the past who also suffered from smallpox, 53 (22.1%) showed no residual pock marks at all, while 32 (13.3%) of those examined had from one to four facial scars. The remaining 155 (64.6%) showed five or more residual smallpox scars on their faces, but only 71 (29.6%) had 25 or more scars. The highest proportion (i.e. 40.7%) of those having no pock marks at all was also found among the youngest age-groups.

There was a noticeable difference between those with a visible vaccination scar and those without a vaccination scar, in the proportion having no residual facial scars as well as among the distribution of the facial pock marks.

As previously detailed, the relation between separate age-groups and the proportion of residual smallpox facial scars was noted. Fig. 1 shows the distribution of facial pock marks by age-groups among those with and without vaccination scars. From this figure it can be seen that the proportion with residual facial pock marks is directly related to age, with low rates in the younger age-groups and higher rates among older persons in both categories.

Table 4 and Fig. 2 show the distribution of facial pock marks among adult (14 years old and older) examinees by sex and vaccination status.

TABLE 4. DISTRIBUTION OF FACIAL POCK MARKS AMONG PATIENTS BY SEX AND VACCINATION STATUS

No. of facial pock marks	Females				Males			
	Vaccinated		Unvaccinated		Vaccinated		Unvaccinated	
	No.	%	No.	%	No.	%	No.	%
0-4	20	40.0	2	(7.0)	18	27.7	1	(5.8)
5-24	13	26.0	7	(26.9)	28	43.1	2	(11.7)
25+	17	34.0	17	(65.4)	19	29.2	14	(82.5)
Total	50	100.0	26	(100.0)	65	100.0	17	(100.0)

Finally it is notable that there was no noticeable difference in the frequency of facial pock marks between patients examined 18 months after the attack in comparison with those examined 24 months after onset of the disease. However, since the number of cases is low, this conclusion is necessarily only tentative.

#### 4. DISCUSSION

The general impression that permanent scarring follows all cases suffering from variola major is not correct nor valid. From this study it can be seen that about 25% of survivors of variola major attack were left with no pock marks at all or less than five visible pock marks on their faces one-and-a-half to two years after the attack.

In fact, according to our present accepted definition, a "person with pock marks" is an individual who has at least five visible pock marks on his face with a base-diameter of 2 mm or more.

This study demonstrates that the persistence and the frequency of facial pock marks depend upon the immunity status of the affected person at the time of the attack, varying from a low of 65% for vaccinated to a high of 85% among unprotected persons. Similarly the clinical variety and the type of the case depends upon the immunity status. Field experience, as well as hospital observations (A. R. Rao), showed that more than 25% of vaccinated persons developed a modified variety of smallpox as against about 2% of the unvaccinated.

Furthermore, the frequency with which smallpox scars are retained is directly related to age, varying from a low of about 55% for children under five to 76% in adults. This conclusion is in direct contradiction with hospital observations (A. R. Rao, 1971), showing that the scars of smallpox persist more in children in the 0-14 years age-group than in adults.

With reference to sex, there is only a slight difference in frequency with which facial scars are retained, being 71% in females as against 77% in males. This difference between the two sexes was more marked among the vaccinated, being 60% for females as against 72% for males.

Finally, no correlation between the frequency of residual facial pock marks and the interval between the attack and follow-up has been observed.

#### 5. SUMMARY - CONCLUSION

In order to determine the frequency of retention of residual facial pock marks among persons suffering from variola major, a survey was undertaken in 280 outbreaks where the diagnosis of variola major had been confirmed by the laboratory. A total of 464 patients were carefully examined and the frequency of their pock marks recorded and the results analysed.

The study demonstrates that persistence and also frequency of residual facial pock marks depend upon vaccination status, age and sex of the patients. Smallpox facial pock marks persisted more in unvaccinated than in vaccinated, more in adults than in children, more among males than females.

Loss of facial pock marks seems to be an important element in all surveys based on the prevalence of smallpox facial scars aimed at estimating the actual incidence of smallpox or reporting efficiency or with the object of providing additional information on the history of smallpox transmission in an observed area.

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FIG. 1. NUMBER OF FACIAL POCK MARKS BY AGE-GROUP AND VACCINATION STATUS (PERCENTAGES)

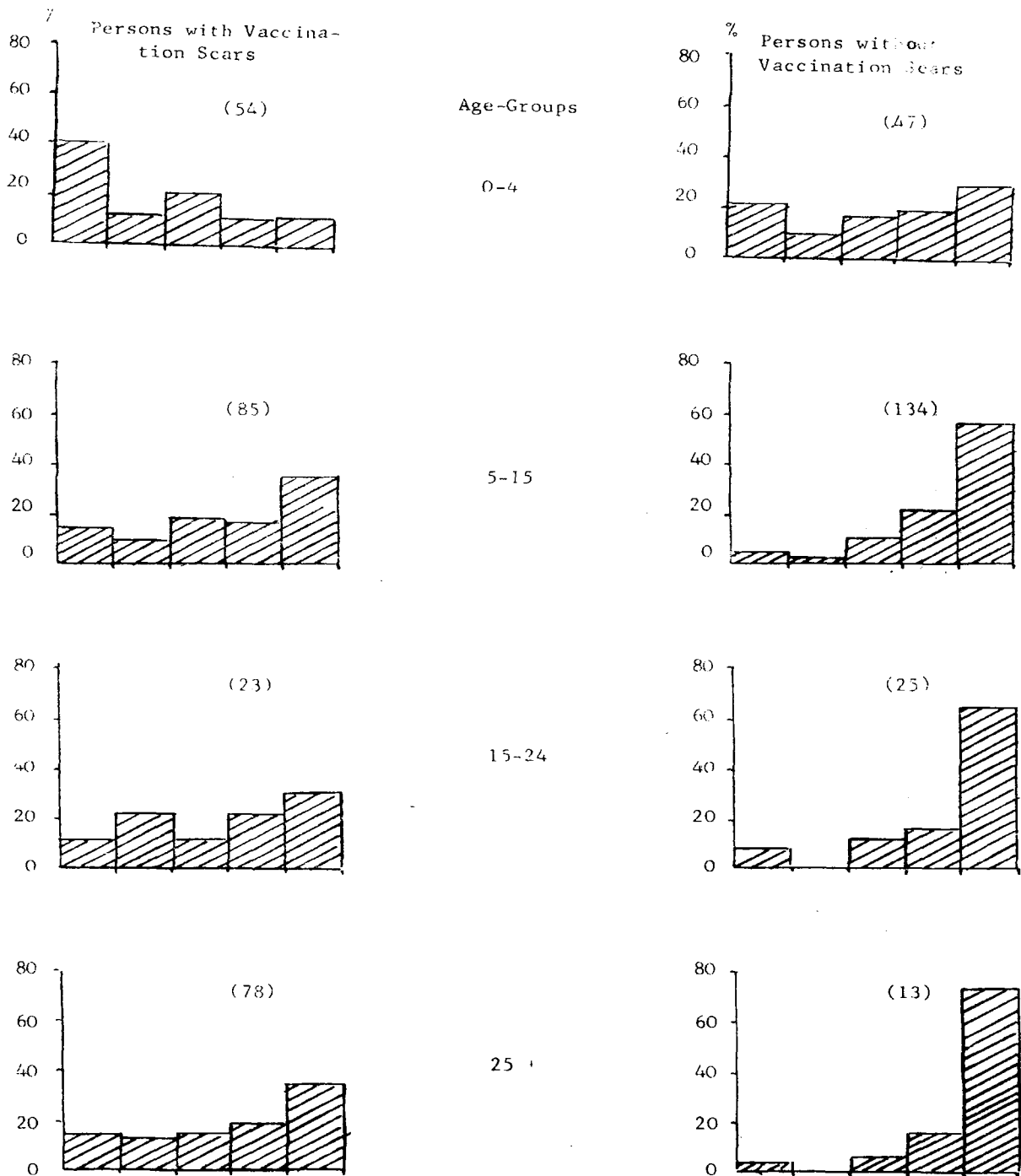


FIG. 1 (CONTINUED)

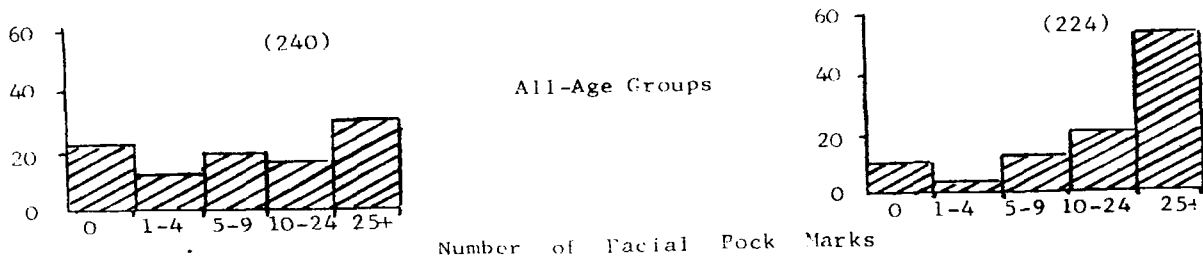
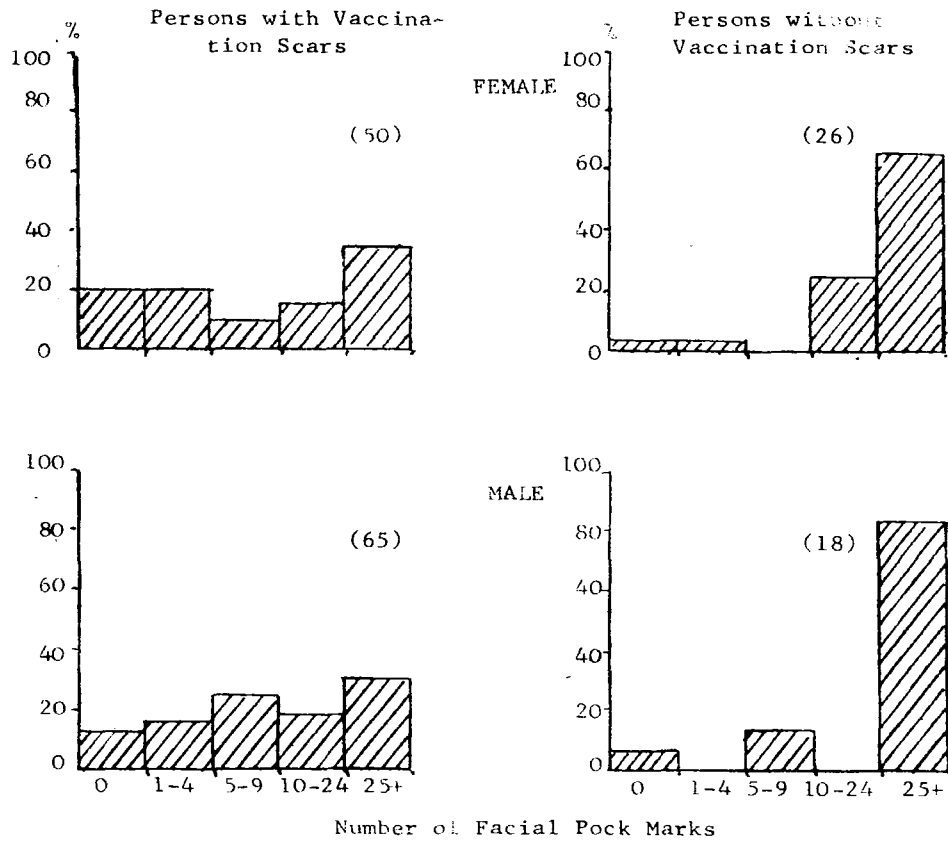


FIG. 2. FREQUENCY DISTRIBUTION OF FACIAL POCK MARKS (PERCENTAGES)



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