COVERAGE AND EFFICACY OF MEASLES IMMUNIZATION IN RURAL AREAS OF ALIGARH

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ABSTRACT:

Research Problem: How effective is the measles immunization programme in rural areas?

Objectives:

i) To determine the vaccine coverage in eligible children.
ii) To estimate the seropositivity in immunized children.
iii) To assess the decline in maternal antibody levels in 0 - 9 months old children.
iv) To study the socio - cultural variables in the study area.

Study Design: Cross sectional study.

Setting: Registered villages under Rural Health Training Centre (RHTC), Jawan Block, Aligarh.

Participants: Children in 0 - 5 yearrs age group, from 2104 house holds by systematic random sampling.

Sample size: 456 children in 0 - 5 years age group.

Study Variables: Age, sex, immunization status, measles antibody, type of family, overcrowding, literacy status of parents, occupation of parents.

Statistical Analysis: By proportions.

Result: 0 - 5 years age group made up 13.7% of the population. Most of the families belonged to lowe socio-economic groups. Measles immunization coveage was 64.5% with sero conversion in 96.5% children while failure rate of vaccine was 3.5%. Maternal mealses antibody level showed linear decline with age from 100% at 0 - 3 months to 18.4% at 6 - 9 months.

Key Words: Measles immunization coverage, Rural area, Seroconversion, Maternal antibody.

INTRODUCTION:

Measles infection continues to be a major public health problem in developing countries. In EPI Update, 1993, WHO estimates that around 1.4 million children die of measles every year, primarily in developing countries. In India, many cases of measles are not reported. However, according to Measles Update, 1990, every year there are some 20 million cases of measles, with a minimum of 2 lakhs measles associated deaths .

Measles immunization has proved to be a cost effective method of protection against the disease.The National Immunization Schedule advocates vaccination against mealses at 9 to 12 months of age. This is early enough to prevent most cases and late enough to avoid interference from maternal antibodies. Measles immunization coverage needs to be at least 94%-97% to provide fully protective "herd immunity" to interrupt transmission.

The effectiveness of National Immunization Programme depends not only on availability of services, but also on acceptibility and utilization of services. Full control of measles has not been achieved because of the difficulty in reaching the infant population and because of primary and secondary vaccine failure. This study was undertaken to assess the impact of immunization pogramme in rural areas, to determine the vaccine coverage in eligible children in the study area, to find out the socio-cultural variables in relation to measles immunization, to assess the pattern of decline of maternal antibodies in 0-9 months children and to estimate the seropositivity for measles antibodies in vaccinated children.

MATERIAL AND METHOD:

The study was carried out in 9 villages registered under the Rural Health Training Centre , Jawan of the Department of Community Medicine, having a total population of 13,684 persons living in 2104 households. There

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were 1880 0 - 5 year old children in these households comprising 13.7% of the total population (Table I). Using systematic random sampling, 25% (470 cases) of 0-5 year old children were included in the study. However, 14 children could not be screened due to non availability / lack of co-operation. Therefore, a total of 456 children comprised the study population.

A house to house visit was made and the mothers, or the heads of family were interviewed in a friendly, non-formal manner. The child was examined and with prior permission, a blood sample was collected for serological tests on Whatmans No.3 filter paper within the inscribed circles.Data was recorded on pretested proforma and later tabulated and analysed. Blood samples were analysed for measles antibody titre by HAI test (method described by Khare et al).[2]

OBSERVATIONS:

1) Age & Sex: Of the total 456 children in 0-5 year age group, 266 (58.3%) were males and 190 (41.7%) females (Table II).The maximum number of children (36.8%) were in 0-1 year age group followed by 1-2 year age group (19.3%).

Of the 168 infants (0-1 year) in the study population, there were 98 (58.3%) males and 70 (41.7%) felmales. Table III.The maximum number of infants were 50, in 3-6 months age group.

2) Socio-economic parameters: In this rural population studied, joint family system was predominent in 94.1% cases (Table IV). A majority of families were living in kutcha or semi pucca houses (77.2%), where overcrowding was present (74.2%), reflecting their lower socio-economic status. The majority of families belonged to lower social classes - IV and V (86.9%) 65.5% mothers and 56% fathers were illiterate. About 2 / 3rds. of the fathers were agricultural workers (66.2%).

3) Measles vaccination: Out of 332 children eligible for measles vaccination (9months to 5 years) 214 (64.5%) were immunized and 118 (35.5%), un-immunized (Table V). More male children were immunized (41.3%) compared to female children(23.2%). However, the difference in immunization status was not statistically significant.

4) Measles antibody titre in immunized children (9 months to 5 years): Out of 214 children immunized against measles, immunization could be confirmed in only 202 children, where immunization card was available. In these 202 children serological test for measles antibody showed that 195 (96.5%) were seropositive and 7(3.5%) were seronegetive. The antibody titre in 195 seropositive cases is shown in Table VI and Fig.I. The distribution of antibody end titre showed a linear decline with age, with the majority of children in younger age group of 9-12 months and 1-2 years (73.0%) having a high titre of 1:128 and/or 1:256, and the majority of children in 4-5 years (71.1%) having a low titre of 1:16 and /or 1:32.

5) Seropositivity in 0-9 months children: To measure the passively acquired maternal antibody level in various age groups, the blood was tested for measles antibodies in 124 children in 0-9 months age group.(Table VII and Fig.II). The seropositivity showed a linear decline with age. In 0-3 months age group, 100% children were seropositive, in 3-6 month age group 80% and in 6-9s months age group 18.45 % were sero positive. There was a positive correlation (r=0.77) between decline of seropositivity and age.

DISCUSSION:

0-5 years old children made up 13.7% of the population. Males outnumbered females in all age groups. The sociocultural parameters studied show that a majority of the population belongs to the low socio-economic group, as reflected by social class, literacy status and housing conditions. Most families were dependent on agriculture - based occupations. These findings are similar to the observations made by other workers in the same area.[3,4]

The overall literacy status was lower (39.3%) than the national average of 52.1% as well as lower than the average of 41.7% for Uttar Pradesh.(1991 Census).

The measles immunization rate of 64.5% is lower than the estimated national coverage of 77% (WHO,1991). However, the Extended Coverage Evaluation Survey (1995) in 15 districts of U.P.[5] revealed only 40.3% children in 13-24 months immunized against measles.

A high proportion of children (96.5%) show seropositivity after immunization, reflecting the effectiveness and potency of the vaccine, as also reported by Ghosh et al[6].The failure rate of 3.5% observed in the present study could be due to either primary vaccine

failure, which is reported to occur at a rate of 4-8%, or due to decline in titre over the years after initial vaccine "take-up." The decline in titre , or secondary vaccine failure has been reported by several authors.[1,7,8]

Maternal antibody titre showed linear decline with age from 100% seropositivity at 0 - 3 months to 18.4% in 6 - 9 months age group.

CONCLUSION:

The measles immunization provides effective protection against measles in a majority of children in remote rural areas with poor socio-economic background. However, the lower levels of coverage in the girl child is cause for concern.

TABLE - I

DETAILS OF STUDY POPULATION

S. No.	Registered village	Total population	Total no. of houses	No. of under 5 yrs. children	25% total under 5 children
1.	Jawan	3310	622	471	118
2.	Sumera Jhal	272	34	0.33	8
3.	Jawan - Sikanderpur	1172	142	136	34
4.	Chota Jawan	1025	170	125	31
5.	Gadiya Bhojpur	880	110	139	35
6.	Tejpur	1189	173	180	45
7.	Sumera	2690	412	372	94
8.	Sudiyal	859	108	112	28
9.	Cherat	2287	333	307	77
	TOTAL	**13, 684**	**2104**	**1880**	**470**

TABLE - II

DISTRIBUTION OF STUDY POPULATION BY AGE AND SEX

Age in years	Male	Female	Total	%
0 - 1	98	70	168	36.8
1 - 2	50	38	88	19.3
2 - 3	49	34	83	18.3
3 - 4	28	22	50	10.9
4 - 5	41	26	67	14.7
TOTAL	**266 (58.3%)**	**190 (41.72%)**	**456 (100%)**	

(n = 456)

TABLE - III

DISTRIBUTION OF INFANT POPULATION BY AGE AND SEX

Age in years	Male	Female	Total
0 - 3	15	10	25 (14.9)
3 - 6	28	22	50 (29.8)
6 - 9	29	20	49 (29.2)
9 - 12	26	18	44 (26.1)
TOTAL	**98 (58. 3)**	**70 (41.7)**	**168 (100)**

(n=168) (Figures in parenthesis indicate percentage)

TABLE - IV

DISTRIBUTION OF SOCIO - CULTURAL PARAMETERS IN STUDY POPULATION

S.No.	Parameter	No.	%.
1.	**Type of family**		
	Joint	429	94.1
	Unitary	27	5.9
2.	**Housing**		
	Kutcha	182	40
	Kutcha - pucca	170	37.2
	Over crowding		
	Present	338	74.2
	Absent	118	25.8
3.	**Religion**		
	Hindu	409	89.6
	Muslim	47	10.4
4.	**Literacy status of mother**		
	Illiterate	299	65.5
	Literate	157	34.5
	Father		
	Illiterate	255	56.0
	Literate	201	44.0
5.	**Occupation of father**		
	Agriculture	302	66.2
	Other	154	33.8
6.	**Social Class**		
	Upper social class (I,II,III)	60	13.0
	Lower social class (IV, V)	396	86.9

TABLE - V

MEASLES IMMUNIZATION STATUS OF STUDY POPULATION BY AGE AND SEX

Age	Study population			Immunized			Not immunized		
	M	F	Total	M	F	Total	M	F	Total
9 - 12.mths.	26	18	44	16	12	28	10	6	16
1 - 2 yrs.	50	38	88	33	24	57	17	14	31
2 - 3 yrs.	49	34	83	39	15	54	10	19	29
3 - 4 yrs.	28	22	50	19	13	32	9	9	18
4 - 5 yrs.	41	26	67	30	13	43	11	13	24
TOTAL	**194**	**138**	**332**	**137**	**77**	**214**	**57**	**61**	**118**
				(41.3)	**(23.2)**	**(64.5)**	**(17.2)**	**(18.3)**	**(35.5)**

(n=332) (Figures in parenthesis indicate percentage)

TABLE - VI

MEASLES ANTIBODY TITRE AND GEOMETRIC MEAN TITRE IN SEROPOSITIVE CHILDREN

Age	Measles antibody titre					GMT	Total no. of children
	1:16	1:32	1:64	1:128	1:256		
9 - 12 mths.	0	3	4	5	14	142.4	26
	(0)	(11.5)	(15.4)	(19.2)			
1 - 2 yrs.	5	6	9	23	11	92.86	54
	(9.3)	(11.1)	(16.6)	(43.6)	(20.4)		
2 - 3 yrs.	8	2	19	13	5	38.19	47
	(17)	(4.3)	(40.5)	(27.6)	(10.6)		
3 - 4 yrs.	12	6	9	3	0	34.29	30
	(40)	(20.0)	(30.0)	(10.0)	(0)		
4 - 5 yrs.	28	7	10	1	0	27.6	38
	(52.7)	(18.4)	(26.3)	(2.6)	(0)		
TOTAL	**45**	**24**	**51**	**45**	**30**	**61.98**	**195**
	(23)	**(57. 2)**	**(28.6)**	**(23.1)**	**(15.4)**		

(n=195) GMT = Geometric mean titre (Figures in parenthesis indicate percentage)

TABLE-VII

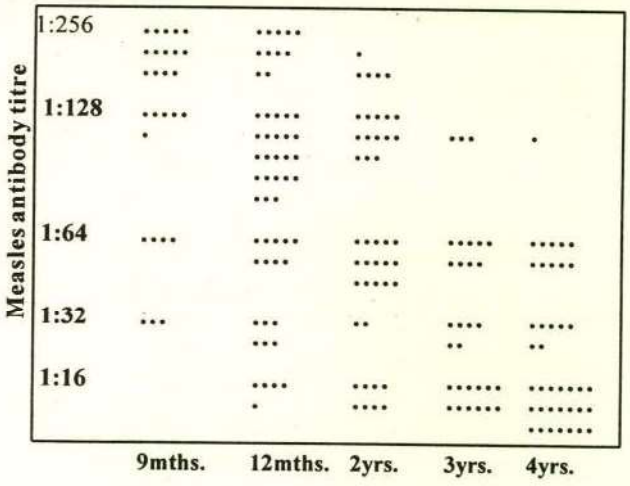
DISTRIBUTION OF 0 - 9 MONTHS OLD CHILDREN BY AGE AND SEROPOSITIVITY

Age in months	No. of sero+tive children	No.of sero-tive children	Total
0 - 3	25 (100)	0 (0)	25(100)
3 - 6	40 (80)	10 (20)	50(100)
6 - 9	9 (18.4)	40 (81.6)	49(100)
TOTAL	**74(59.7)**	**50(40.3)**	**124(100)**

(n=124) (Figures in parenthesis indicate percentage)

FIGURE-I

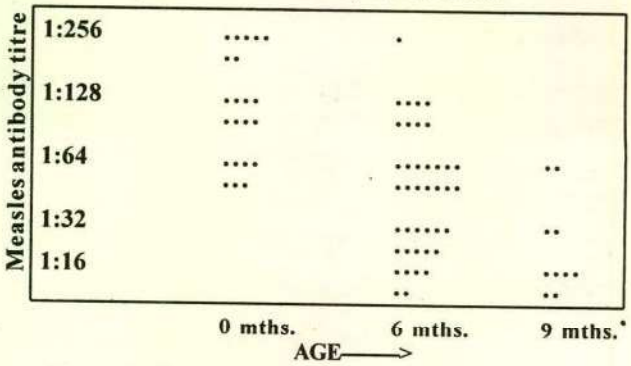
MEASLES ANTIBODY TITRE IN VACCINATED SEROPOSITIVE CHILDREN HAVING IMMUNIZATION CARD (n=195)



The . indicates one child

FIGURE-II

MEASLES ANTIBODY TITRE IN 74 SEROPOSITIVE (0-9 MONTHS OLD) CHILDREN



The . indicates one child

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