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Towards A Malaria Vaccine ?

The last few years have seen a marked change in the understanding of malaria immunology. We have very little knowledge on immunity of Malaria based on experiments in human beings due to ethical reasons. Whatsoever our knowledge exists at present is based on experiments in mice and monkey. However it is clear that it is sporozoite or merozoite which is directly exposed to our immune system in the life cycle of Malaria parasite. On the basis of human experiments we can draw inference that immunity to malaria is species-specific (on cross immunity), stage specific and strain specific as well acquired in the response to surface antigen and relapsed antigen although the parasite also demonstrates escape mechanism to immune system.

So the host system kills or eliminate the parasite by means of (a) Antibody to extracellular form of parasite with the help of mechanism of Block invasion, Agglutination or opsonization and/or (b) Cellular mechanism-either by phago-cytosis of parasite or by antibody dependent cellular cytotoxicity ABCC (?) or by effects of mediators like tumor necrosis factor (TNF) in cerebral malaria or crisis forming factor as found in sudan or by possible role of lysis mechanism.

However, inspite of all these theories the parasite has been able to invade the immune system by virtue of its intracellular development stage specificity, sequestration in capillaries and also by its unusual characteristics of antigenic diversity and antigenic variation.

So on the basis of our knowledge on immunity of malaria the aim of possible malaria vaccine may be fixed for either vaccine for malaria infection versus malaria disease or for a traveller vaccine versus endemic vaccine. To achieve this we can targets malaria vaccine on

- (a) Intracellular form of parasite either erythrocytic or hepatocytic stage.
- (b) Extra cellular form either sporozoite or gametocyte

The possible approaches for development of an effective malaria vaccine may be :-

1. Parasite antigen vaccine.
2. Infectious vector vaccine.
3. Anti-idiotypic vaccine.
4. Sub-unit vaccine.

1. **Parasite Antigen Vaccine :** It is very difficult to get purified parasite antigen in man due to practical reasons.

2. **Infectious vector vaccine :** The circum-sporozoite protein NANP 40 seems to be emerging as source of potent antigen efforts are being made to develop vaccine using NANP 40 expressed in recombinant *E. coli* and also using vaccinia virus or salmonella as vector.

3. **Anti idotype vaccine :** Anti-Igm derived from infected Malaria antigen can be act as a candidate vaccine. The Malaria vaccine so produced is hopeful to achieve :—

(a) 100% protection-It can be achieved using sporozoite vaccine which may lead to no malaria infection and subsequents prevention of disease and prevention of transmission.

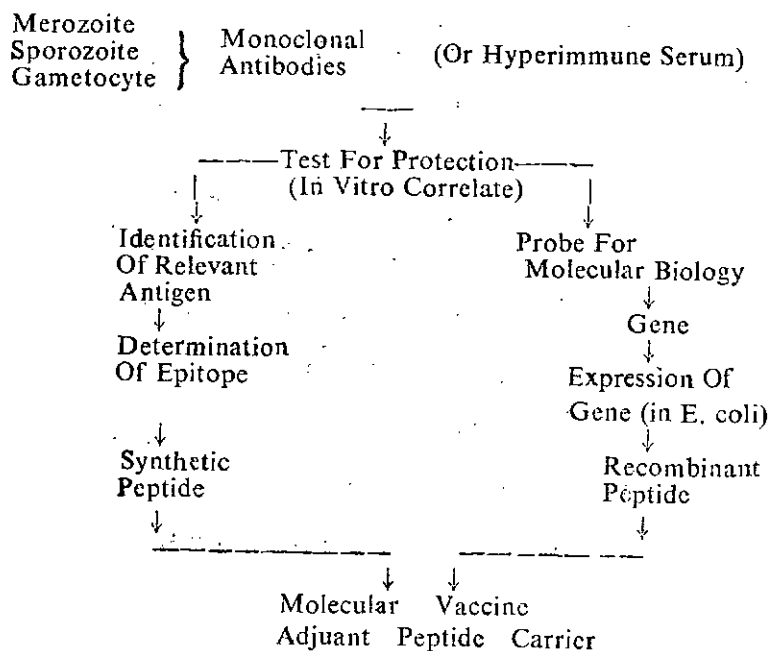
(b) Partial protection using gametocyte antigen however there will be infection with reduced mortality but no transmission.

(c) However one should consider the possibility that the vaccine so produced may not be able to produced any prevention against infection, disease and transmission due to certain unknown reasons.

4. **Molecular or sub unit vaccine :** The strategy for sub unit vaccine is to develop molecular vaccine derived from monoclonal antibody and adjuvant peptide carrier where. *E. coli* epitopoe can be attached to an adjuvants and B. cell epitope to a carrier however it has MHC restriction The such Strategy be understand by fig. 1.

FIG.-1

STRATEGY FOR THE DEVELOPMENT OF MALARIA VACCINE



Feeding Practices In Icds and Non-Icds Areas :

Some Observations In An Oldest Project

Sanjay Chaturvedi¹,

J.V. Singh² &

B. C. Srivastava³

Introduction :

ICDS Scheme, launched in India in 1975-76, is perhaps one of the largest child development programmes in the world. Active community intervention for a qualitative change in child rearing practices has been intensely advocated during recent decades and with health and nutritional education for 15-45 years women, ICDS is supposed to play a big role in it. Fortunately breast feeding is universally practised maternal norm in our country and that too for quite a long period but weaning is the area causing lot of concern.

As a part of a series of detailed community investigations, this study was conducted in Dalmau block (Dist. Rae Bareilly, U.P.), one of the oldest projects in our country, to compare the feeding practices in ICDS and non-ICDS areas to take a view of schemes impact in terms of change in child rearing habits.

Material & Methods :

These observations were recorded in ICDS block Dalmau and an adjoining Non-ICDS block Lalgaon of Distt. Rae Bareilly (U.P.) while conducting a detailed study on impact of ICDS. Study area Dalmau is one of the oldest project in India where ICDS scheme was started in 1975-76, Adjoining block Lalgaon was selected as control area because it is similar to Dalmau in social, anthropological and geographical aspects and welfare services available to community except the ICDS. Mothers of 214 children from three randomly selected villages of Dalmau block and 205 children from three randomly selected villages of Lalgaon block were interviewed regarding total duration of breast feeding and age at weaning. Total duration of breast feeding was referred to a period till the child was put on the breast, which could be in addition to other food stuff. The data was recorded on a pre-tested schedule.

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Observations and Discussion :

In ICDS group there was only one child (0.47%) out of 214 children and in Non-ICDS group there were three children (1.46%) out of 205 children, with no breast feeding at all. In most of the children of both the groups, the total duration of breast feeding was ranging from 12 to 23 months

(ICDS=72.29%, Non-ICDS=74.25%). 10.33% children in ICDS group and 9.90% children in Non-ICDS group were having total duration of breast feeding 24 months and above. These differences between the two groups were not found to be significant statistically. Mean duration of breast feeding in ICDS and Non-ICDS groups was 16.34 and 16.76 months respectively.

Table I : Total Duration of Breast Feeding

Duration of Breast Feeding (Months)	I.C.D.S. Group		Non-I.C.D.S. Group	
	No.	%	No.	%
5 & below	7	3.29	8	3.97
6—11	30	14.09	24	11.88
12—17	85	39.90	88	43.56
18—23	69	32.39	62	30.69
24 & above	22	10.33	20	9.90
Total	213	100.00	202	100.00

($\chi^2=0.96$, d.f.=4. $p>0.50$)

Majority of the children were weaned between 6—11 months of age in ICDS group (54.67%) while in non-ICDS group majority of the children (49.76%) were weaned between 12—17 months of age. All the children in ICDS group were weaned before attaining the age of 24 months while in Non-

ICDS group there were 11 (5.36%) children who were weaned after 24 months of age. These differences were found to be statistically significant. Mean age at weaning was 10.75 months in ICDS area and 16.28 months in Non-ICDS area.

Table II : Age at Weaning

Age at weaning	I.C.D.S. Group		Non-I.C.D.S. Group	
	No.	%	No.	%
5 & below	18	8.41	7	3.41
6—11	117	54.67	32	15.62
12—17	53	24.77	102	49.76
18—23	26	12.15	53	25.85
24 & above	0	0.00	11	5.36
Total	214	100.00	205	100.00

($\chi^2=84.86$, d.f. (After merging last 2 rows)=3, $P<0.001$)

Feeding practices in ICDS & Non-ICDS Areas : Some Observations

Breast feeding was almost universally accepted method for feeding of infants in both the groups. Practice of breast feeding by almost all the rural mothers has consistently been reported (Idris et al 1981, Gupta et al 1984, Sharma et al (1977), Bahl (1978), Katiyar et al (1981), and Gupta et al (1984) have also reported the same phenomenon in rural areas. Prolonged breast feeding in no way harms the child, but it has harmful effects on mother's health influencing the outcome of subsequent pregnancy. It is desirable that when we talk of promoting breast feeding we should also educate the mothers when to stop the breast feeding.

Majority of children in ICDS area (63.08%) and only 19.03% in Non-ICDS area were weaned before one year. This can be regarded as the most significant achievement of ICDS Scheme in the field of infant nutrition but lot more is needed to be done in this regard. Although the age at weaning in ICDS group was significantly lower, which could be due to the health education of mothers by Anganwadi Workers, only 8.41% children, even in the ICDS group, were weaned before the age of six months. Almost similar observations have been made by Gupta et al (1984) while working in the same area. Delayed weaning in rural areas has also been documented by many other workers (Sharma 1977, Bakshi et al 1977 and Katiyar et al 1981 to mention a few of them). This leaves much to be accomplished and we can hope for improvement in future.

Though the situation is far from ideal and investigations conducted at national

level are giving more acceptable answers, it can be said in context of present study that significant difference in study and control group can be attributed to the exposure of mothers to services rendered through ICDS Scheme and can be taken as an important achievement of this project.

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Immunization Services In Rural Population

-Campaign vs Clinical Approach

A. K. Bhardwaj¹, B. P. Gupta², D. D. Rana³, H. M. Swami⁴, and N. K. Vaidya⁵.

Introduction

In the world today, most of our problems can be prevented at community level through change in social behaviour and at a reasonable low cost. To achieve this, we will have to transform available knowledge and technology into action. In 24 hours, app 40000 under-five children die, and out of this, 80% can easily be saved through preventive measures (UNICEF, 1989). Immunization, which can alone save 3 million children out of 14 million who die every year, is the most cost-effective programme. During this decade, through determined efforts, the developing countries have been able to increase the proportion of immunized children from 10% to 50% and are now saving the lives of nearly 1.5 million children annually (UNICEF, 1989).

In our rural areas, scattered population and difficult terrain limits the access to the health institutions thus contributing to the

low immunization coverage in most parts of our country (Bhargava and Sokhey, 1985). It has been recommended that till such time our primary health care system becomes capable of achieving near universal immunization coverage, a strategy of campaign approach involving different agencies should be adopted (John and Steinhoff, 1981).

To prove the value of such programme, an immunization coverage assessment was undertaken in a Rural block in Himachal Pradesh.

Materials and Methods

The survey was conducted in Lad-Bhrol, a Rural block of district Mandi in Himachal Pradesh. Immunization services in this block is provided through under-5 clinics and various immunization camps conducted in the areas by a team from block headquarters. A WHO recommended cluster sampling technique was used (Hendersen and Sunderesan 1982), and 210 children between the age,

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Immunization Services in Rural Population-Campaign VS Clinical Approach

group of 12-23 months were identified. The immunization status was confirmed from the relevant registers maintained at the respective local health institution and also from the records available at the block headquarters. A child who had three doses each of DPT and OPV, and had undergone BCG and measles immunization was considered as fully immunized. A child having no vaccination at all was termed as un-immunized. All other children were taken as partially immunized. Parents were inquired regarding the source of immunization. Reason for not availing these services were also inquired from the parents of the children.

Observations

Out of 210 children identified in this study, 94 (44.76 %) were found fully immunized, 88 (41.91%) were partially immunized whereas 28 (13.33%) were un-immunized. Out of 94 fully immunized children, only 18 (19.1%) were immunized at clinics and as many as 76 (80.9%) had received immunization in various camps organised in the area.

Vaccines wise Coverage for BCG was highest (69.05%). It was 47.14% for measles. As many as 59.05% and 6.67% children received three doses of DPT and OPV respectively. Drop out rate from I-III dose was 21.52% for DPT and 20.13% for OPV.

Table-I. Coverage with different vaccines.

Vaccines	No.	Percent
Measles	99	47.14
B C G	145	69.05
D P T I	158	75.24
II	142	67.62
III	124	59.05
Drop out I-III		21.52
O P V I	149	70.95
II	131	62.38
III	119	56.67
Drop out I-III		20.13

The majority of children received vaccination during various camps. As compared to 71.7% only 28.3% children

received measles vaccine in Under-5 clinics organised in PHC/Sub-centres/ civil dispensary. Same was the case with other vaccines also.

Table-II Source of Immunization.

Vaccine	Source in Percentage	
	Clinics	Camps
Measles	28.3	71.1
B C G	24.9	75.1
D P T I	29.8	70.2
II	27.5	72.5
III	18.5	81.5
O P V I	32.2	67.8
II	39.7	60.3
III	16.8	83.2

Ignorance of the complete schedule (13.8%) and need of immunization (12.1%), illness of the child at the due date of vaccination and busy parents, 11.2% each and no

information of the camp date (12.1%) were the main reasons for partial immunization and non-immunization.

Table-III. Reasons for non-immunization and partial immunization. (N=116)

Reasons	No.	Percent
1. Information of the camp not recieved	14	12.1
2. Un-aware of the complete schedule of vaccination	16	13.8
3. Out of station on camp date	8	6.9
4. Child ill on the due date	13	11.2
5. Parents busy	13	11.2
6. Forgot about the date of the camp	8	6.9
7. No faith in Immunization	10	8.6
8. Unaware of the need of vaccination	14	12.1
9. Afraid of side reactions	12	10.3
10. No definite reason	8	6.9

Discussion

It has been observed in this study that of completely immunized children about four fifth were immunized during various Camps organised in the area. Higher coverage by camp services clearly shows that coverage can be increased impressively in the Rural areas. Similar findings have also been observed by other workers in India (John et al., 1983, and Balraj and John, 1986). Success of this type of approach has also been emphasised by workers from other countries (Risi, 1984).

The efficacy of immunization services depends on information which should reach the parents, their compliance, and delivery of vaccine. In camps, public has to be informed in advance and a day is fixed. As many as 12.1% did not receive the information in this study and another 6.9% forgot about the date. So the involvement of media has its role here. Wide publicity utilising popular channel of communication should be undertaken before initiating such campaign.

Social mobilization which is an important component of immunization programme can be speeded through campaign approach in one sitting. Still many people have misconceptions regarding immunization as revealed in this study.

As mass campaigns involve more than one agencies, increased cooperation and coordination can be achieved and sustained amongst these agencies for other health activities as well. Backlog of un-immunized under-5 children can also be covered

as health workers in camps can seek out their potential clients with the help and active participation of community leaders, teachers and other village level functionaries. But this type of approach can prove to be expansive, but other field activities can also be combined with these services and it can act as a common platform for all health educational activities. It can therefore be concluded that in Rural areas where access to health institutions is limited, mobile teams campaigns are required till another efficient vaccine delivery system is evolved.

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Possible Cardiotoxic Effects of Vanadium

Parveen Parkash¹ and Anita Gupta²

Introduction :

Vanadium, a ubiquitous element, is physiologically and pharmacologically an active substance and is present in most of mammalian tissues Jandhala and Hom, 1983). Large corpus of information exists on the mode of action of vanadium on cardiac muscles (Jandhala and Hom, 1983., Solaro et al, 1980), but the basis of pharmacological lesion underlying its cardiac toxicity is still poorly understood. Except for the solitary report of Lewis (1958) to best of our knowledge no information exists on the effect of vanadium on the functioning of heart as shown by electrocardiography.

Large amounts of vanadium are released into atmosphere by combustion of fossil fuel (Vouk, 1979) and due to rapid industrialisation its environmental concentration is reported to be increasing (Goldberg et al, 1974., Jaffe and Walters, 1977., Vouk, 1979). This necessitates the monitoring of its environmental and occupational hazards. In the present study cardiac side effects of vanadium, as revealed through ECG has been investigated in rabbits, since the electrocardiogram of rabbit resembles with of man in essential details (Weisborth et al, 1974).

Materials and Methods :

Fifteen healthy male albino rabbits,

weighing 2-2.5 kg each, were procured from Hissar Agriculture University, Haryana. They were housed in steel cages and provided a diet of commercial rabbit pellets and water ad-libitum. The rabbits were observed for two weeks before the study was conducted to allow adaptation to the vivarium environment and to eliminate sick animal, if any. After this these rabbits were divided into three groups of five each. Before ECG recordings, rabbits of first group were anaesthetized with intraperitoneal injection of pentobarbitone sodium (35 mg/Kg of body weight). Electrocardiographic recordings were obtained on ink-jet polygraph with standard limb lead II using fine needle electrode placed subcutaneously and attached to ECG amplifier, adjusted for recorder deflection of 1 cm/mV before vanadium treatment for five minutes. Bolus injection of intravenous (i. v.) vanadium (200 mg/Kg) was given in the ear vein of rabbits. Sodium vandate was dissolved in distilled water (1 mg/ml) and volume of dose was kept 0.2 ml. After this their ECG was recorded for half an hour with a paper speed of 50 mm/sec. Afterwards, ECG records were analysed for R-R interval calculations and thereby heart rate changes. Amplitude and topographic changes were analysed for individual rabbit separately.

For serum potassium analysis, same dose of vanadium was injected similarly in

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the right vein of rabbits of 2nd group. Blood samples were taken before and after 1, 2, 3, 5, 8, 10, 15 and 20 minutes intervals of vanadium treatment from left vein and assayed for serum potassium levels (Reiner, 1974).

In third group of rabbits same volume of distilled water was injected intravenously to check the effect of volume if any. The rabbits were kept under observation for 7 days. No rabbit developed apparent morbidity. All the p-values were obtained by Wilcoxon's two-sample test (one tailed). p-values less than 0.05 were regarded as statistically significant.

Results :

P-wave remained distinct without any change in wave form throughout the experiment. During first 2 min, QRS complex depicted slight decrease in amplitude. However, after this amplitude of the complex

increased and was maintained for 8 min. Later, amplitude of this complex regressed again. The amplitude trend of T-wave was similar to that of QRS complex i.e., initial fall, then increase which was maintained for 8 min, maximum being at 3rd min and final fall (fig. 1). Wave form revealed peculiar changes i.e., it became peaky, long and tented during 3rd minute and gave the appearance of biphasic configuration at the end of 10th min. Raised J point and merger of ST-segment with T-wave was clear at the 3rd min interval (fig. 1). This got converted into another form i.e., ST-segment with convexity upward by the end of 10th min. Rhythm was regular during record. Heart rate before vanadium treatment was 343 ± 32.67 beats/min, R-R interval being 0.175 ± 0.018 sec. Heart rate and R-R interval after 2nd min of i.v. vanadium revealed a fluctuating falling trend. The fall in the heart rate was statistically significant ($p < 0.05$) at 2, 8, 10 and 15 min interval.

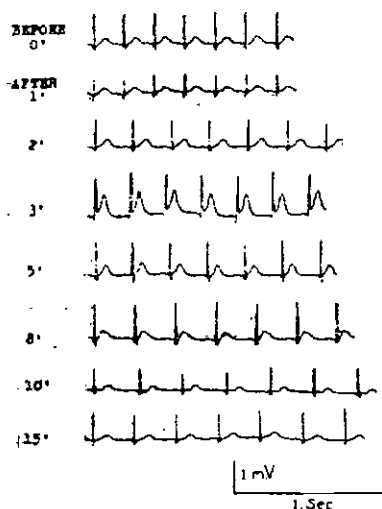


Fig.1 Showing changes in ECG following intravenous vanadium in rabbit

Possible Cardiotoxic Effects of Vanadium

Table 1 : R-R interval and Heart rate changes following intravenous vanadium administration in rabbits.

Interval (Minutes)	R-R interval (Sec)	Heart rate beats/min	Percentage change of heart rate
0	0.175 ± 0.018	343 ± 32.67	—
1	0.176 ± 0.016	341 ± 36.02	0.58
2	0.223 ± 0.025	269 ± 25.32	21.57
3	0.206 ± 0.023	291 ± 31.89	15.16
5	0.215 ± 0.022	279 ± 30.26	18.66
8	0.233 ± 0.020	257 ± 24.72	25.07
10	0.253 ± 0.027	237 ± 22.98	30.90
15	0.241 ± 0.025	248 ± 26.14	27.70
20	0.192 ± 0.012	309 ± 32.14	9.91

n=5

Serum potassium levels started increasing after i.v. injection of vanadium and were statistically significant ($p < 0.05$) at 8, 10 and 15 min interval, maximum being

7.02 ± 0.32 mEq/L 10 min (Tab. 2) later changes in levels were statistically insignificant.

Table 2. Serum potassium levels after intravenous vanadium administration in rabbits (mEq/L).

Control	Time after intravenous injection of vanadium in min.							
0	1	2	3	5	8	10	15	20
5.04 ± 0.29	4.98 ± 0.30	5.08 ± 0.35	5.07 ± 0.27	4.79 ± 0.29	5.45 ± 0.28	7.02 ± 0.32	5.97 ± 0.31	4.87 ± 0.26

n=5

Discussion :

During record of half an hour three phases of myocardial insufficiency first in the form of voltage reduction portraying initial ischemic changes, second in the form

of raised J point and merged ST segment with Tall T-wave reflecting second phase of myocardial insufficiency culminating into third phase of ischemic changes as depicted through low voltage ECG coupled with ST-segment showing convexity upward

suggest vasoconstrictive effect of different grades on coronaries. The potent vasoconstrictive action of vandate in vitro as well as in intact animals has already been reported (Borchard et al, 1981. Hudgins and Bond, 1981., Ozaki and Urakawa, 1980). However, the form of observed myocardial insufficiency is different from that of Lewis (1958) who reported ST-segment depression. The present discrepancy could be due to dose or route differences. Amplitude changes of ECG segment suggest that vanadium can modulate cardiac contractions (Solaro et al, 1980). Vanadium decreased heart rate progressively. This goes parallel with the report of (Inciarte et al, 1980), where intravenous infusion of vanadium resulted in decreased heart rate in dogs. Variation in the amplitude of T-wave suggest that vanadium does affect the serum potassium levels (Currens and Crawford, 1950). This has been further corroborated through serum potassium analysis. This is complementary to reported effect of vanadium on potassium ions (Inciarte et al, 1980 and Kumar and Corder, 1980). The present T-wave alterations also suggest changes in the levels of circulating catecholamines (Lepeschkin, 1950).

This suggests that mechanism of action of vanadium involves chain of events whose initial steps may be dependent on the presence of vanadium but later on these are self perpetuating but with some differences from the initial events. However, the significance of cardiac changes observed in present study for toxicology and genesis of cardiac disease need further investigations.

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A Study Of Chlorine Demand Of Various Water Sources In And Around Luck now

V.K. Srivastava, R. Chandra and S. Nirupam

Introduction :

The quality of drinking water is a factor of vital importance in public health. Much of the ill health in the under developed countries is largely due to lack of safe drinking water. There can be no state of positive community health and well being without safe water supply (Giroult, 1977).

Chlorination is one of the greatest advances in water purification. Chlorine kills pathogenic bacteria and in high doses destroys the bacterial spores and viruses. It oxidizes iron, manganese and hydrogen sulphide. It also destroys some taste and odour producing constituents in the water (WHO, 1976).

Chlorine demand is the amount of chlorine that is needed to destroy bacteria and to oxidize all the organic matter and ammoniacal substances present in the water. If further chlorine is added beyond this point, free chlorine begins to appear in the water.

Material & Methods :

The samples of water from different water sources in the district of Lucknow

(both rural and urban) were collected for the present study. Besides, water samples from various sources from the surrounding districts viz. Barabanki, Unnao, Sultanpur and Rae Bareli were also collected.

The study was carried out during post-rainy season, in the months of August and September 1988.

(a) **Collection of water samples :** About 5 liter of water sample was collected from each source in plastic container. While taking samples from hand pumps, it was first run for few minutes, and then the container was filled. To collect sample from the ponds, it was taken from a few feet away from the edge of the pond.

For collecting water samples from the wells, water was first taken out in a clean bucket and then transferred into the container. The samples taken from the City of Lucknow, were from public standposts at 3 places : i) Aishbagh-a place near to water works, (ii) Rakabganj-a place about 3 Kms. from water works, and (iii) Chowk-a place about 6 Km. from water works. The idea of taking these samples from different distances of waterworks was to find out the

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amount of chlorine lost during water carriage.

All the wells from where the water samples were collected were open and shallow wells used by the local community for drinking and bathing purposes. The ponds in all the districts were small, shallow with pollution from the surrounding areas. Ponds were mainly used for bathing, washing utensils and also bathing the animals. The hand pumps, included in the present study were locally made, drawing water from upper stratum of the soil and this was mainly used for drinking purposes.

(b) **Estimation of chlorine demand :** All the water samples collected were tested for their chlorine demand within 24 hours of collection by following method. A 0.1% solution of bleaching powder was prepared. 6 glass beakers were taken and filled with 500 cc of sample water. Different quantities of the above bleaching powder solution viz. 0.6, 0.8, 1.0, 1.2, 1.4 and 1.6 ml. were added to these water beakers, and allowed to stand for 20 minutes. Then a small quantity of starch-iodide solution was added to each beaker. 20 minutes after adding the starch iodide solution, the lowest dose of bleaching powder solution giving a distinct blue colour was noted down; and this was taken as a correct dose of the bleaching powder. Number of ml. of bleaching powder solution giving this distinct blue colour $\times 2$ gives the amount of bleaching powder in pounds required for 1,00,000 gallons of water or 1,000,000 lbs. of water to be chlorinated. In other words, this amount of bleaching powder is ppm. of bleaching powder as chlorine

demand of the water sample (Stewart and Boyd, 1937).

(c) **Estimation of available chlorine in the sample of bleaching powder:**

5 gm. of bleaching powder was taken and dissolved in 500 cc of distilled water, making it a 1% bleaching powder solution. 10 ml. of this solution was titrated against N/10 standard sodium arsenite solution till a starch-iodine paper no longer gave a blue colour. At this stage some starch solution was added to the titrated liquid. Then, by help of a pipette drop by drop N/10 iodine solution was added to it till a permanent blue colour appeared. The number of ccs of N/10 iodine solution used was noted. The number of ccs of N/10 iodine solution solution was deducted from the number of ccs of sodium arsenite solution. The difference so noted gave the quantity of free chlorine in 10 c.c. of bleaching powder solution. Accordingly the percentage of available chlorine in the sample bleaching powder was calculated. In the present study, the percentage of available chlorine in the sample bleaching powder was 35%.

(d) **Calculation of chlorine demand (ppm) for given water sample. -**

The amount of bleaching powder required for 1,00,000 gallons of water multiplied by 0.35 (%) of available chlorine so as to get the ppm. of chlorine as chlorine demand of the given water sample.

Observations :

The chlorine demand of the water sample tested varied from one place to the

other and from source to source. It was lowest (2.1ppm) in the city of Lucknow and highest (7.0ppm.) in the district of Barab-

anki. The chlorine demand as recorded in various water samples is given in Table.

Table : Chlorine demand of various water sample in and around Lucknow

District	Place	Source of water	Chlorine demand (ppm)
1. Lucknow (urban)	a. Aishbagh	Tap water	2.1
	b. Rakabganj	"	2.1
	c. Chowk	"	2.8
2. Lucknow (rural)	Banthra	Handpump	3.5
		Openwell	3.5
		pond	4.9
3. Barabanki	Ram Sanehi Ghat	Handpump	2.8
		Openwell	4.2
		Pond	7.0
4. Sultanpur	Jagdishpur	Handpump	3.5
		Openwell	4.2
		Pond	6.3
5. Rae Bareilly	Bachhrawan	Handpump	2.8
		Openwell	3.5
		Pond	6.3
6. Unnao	Nawabganj	Handpump	4.2
		Openwell	4.2
		Pond	7.0

The chlorine demand of water collected from the city of Lucknow ranged from 2.1 to 2.8. In all the districts around Lucknow, the chlorine demand was lowest (2.8-4.2 ppm) for the samples from handpumps. This value was 3.5-4.2ppm for the water samples from open wells. The chlorine demand was maximum (4.9-7.0 ppm) for samples collected from the ponds.

Discussion :

In the rural areas of Lucknow and the surrounding districts, the sources of drinking water supply are mainly open wells and to a lesser extent, the handpumps. The ponds, are frequently used for cleaning the utensils, bathing and feeding the cattle and less frequently for bathing and swimming of

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human beings. Occasionally, they can be used as a source of drinking water also.

In the city of Lucknow, there is a piped water supply, however, this does not appear to be properly chlorinated. This has clearly been shown by the relatively higher chlorine demand in the samples collected.

In the rural areas, the chlorine demand was lowest for the handpump water. As it draws water from the first stratum of the soil, there is less pollution, compared to samples from open wells, which are frequently exposed to pollution. The ponds are in open areas and are usually low-lying. This leads to gross pollution of its water

from neighbouring places resulting into high chlorine demand.

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Profile of Preschool Diarrhoea in a Rural Community

S. K. Garg¹, V. N. Mishra², M. Bhatnagar³, J. V. Singh⁴, H. Chopra⁵, and R. B. Singh⁶

Introduction :

A significant new knowledge acquired in the last decade on the aetiology, epidemiology, pathogenesis, immunology and treatment of acute diarrhoea provided a solid basis for the immediate attack on the problem. Although acute diarrhoeal disease is one of the major causes of morbidity and mortality among children yet only few studies on diarrhoea related morbidity and mortality are available. An attempt was made in the present study to determine the magnitude of the problem of diarrhoea among preschool children and prevailing health practices so as to plan the action for the control of diarrhoeal diseases among preschool children in rural community.

Material and Methods :

The present study was undertaken among 2105 preschool children belonging to villages of randomly selected five subcentres (clusters) of Primary Health Centre, Rohta of Meerut. The sample was selected as per the W.H.O. specifications and included all the underfive children presently alive in the families at the time of study and all those

underfive children who died during last one year as shown in Table—1.

Diarrhoeal morbidity was considered to be present if the child had diarrhoea within fifteen days prior to study and the diarrhoea was considered as the cause of death if the child had diarrhoea within one week prior to death. Diarrhoea was defined as passing of 3 or more loose or watery stools in a day (I.C.M.R.). The study was conducted by five teams each consisting of one intern and one health worker female and male each and each team was allotted one cluster to complete the survey work.

The survey was conducted by house to house visit, leaving no house, on a pre-designed and pretested schedule. Before commencing the study all the team members were appraised of the contents and during study continuously supervised by the senior teachers of the Department of S.P.M. in the field. The study was simultaneously commenced in all the five clusters and was completed in seven days during September 24 to 30, 1985. The data so obtained was analysed and statistically evaluated.

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Observations :

In all 205 children amongst 2052 living children had diarrhoea during last fifteen days accounting for fortnightly incidence rate of 99.9 per 1000 children. The inci-

dence of diarrhoea varied significantly in different clusters ($P < 0.05$) and it was observed that incidence was higher in far remote areas as compared to areas nearer to Meerut city.

Table 1 : Clusterwise distribution of children and diarrhoea.

Cluster	Subcentre	Children			Diarrhoea cases	
		Alive	Died	Total	No.	Incidence (1000)
1	Kalyanpur	411	11	422	48	115.8
2	Rohta	413	7	420	50	121.1
3	Badam	401	19	420	39	97.3
4	Bhola	409	14	423	42	102.7
5	Kankar Kheda	418	2	420	26	62.2
Total		2052	53	2105	205	99.9

$$X^2 = 9.981$$

$$d. f. = 4$$

$$P < 0.05$$

A majority (60.0%) of the diarrhoea cases occurred below two years of age and were almost equally distributed during first year (29.8%) and second year (30.2%) of life. The percentage of diarrhoeal cases

progressively declined with the advancement of age. The diarrhoeal morbidity was almost equal among males (51.2%) and females (48.8%).

Table 2 : Age-wise distribution of diarrhoea cases.

Age (Years)	Diarrhoea cases	
	Number	Percent
Below 1	61	29.8
—2	62	30.2
—3	55	26.8
—4	16	7.8
—5	11	5.4
Total	205	100.0

All the cases of diarrhoea were classified for severity: on the basis of frequency of motions per day. Only 22 (10.7%) cases had severe degree of diarrhoea with ≥ 11 motions per day while 98 (47.8%) cases had moderate diarrhoea with 5 to 10 motions per day and rest 85 (41.5%) cases had mild diarrhoea passing 3 to 4 motions per day.

Type of therapy as classified in Table-3 depicts that about one fourth (26.8%) of the diarrhoeal cases had no treatment for their illness and nearly half (48.8%) of the cases were treated only with oral fluids and interestingly only one (0.5%) case required intravenous fluid therapy,

Table-3. Type of therapy in diarrhoea cases.

Therapy	Treated cases	
	Number	Percent
Home remedies	72	35.1
Salt sugar solution	11	5.4
O.R.S. packets	17	8.3
Intravenous fluids	1	0.5
Other treatments	49	23.9
No Treatment	55	26.8
All cases	205	100.0

In all 53 deaths were recorded among the underfive children during the last one year prior to study accounting for a pre-school child death rate of 25.2 per 1000 children. Diarrhoea accounted for 28.3% (15 deaths) of total deaths resulting in diarrhoeal disease death rate of 7.1 per 1000 children.

Discussion :

The fortnightly incidence of diarrhoea in the present study was found to be 99.9/1000 children which is quite comparable to 91.98/1000 at Nilgiri in Tamilnadu (N.I.C.D., 1984). The overall fortnightly incidence

in U.P. was recorded as 132/1000 children during the corresponding period (Verma, 1986). However the incidence in Varanasi was much higher (218.36/1000) in Sept. 1984 (N.I.C.D., 1984).

Diarrhoea was found to be uniformly higher below two years of age and minimum in the age group 4-5 years in the present study and almost equal in both sexes. Similar were the findings in Varanasi excepting the incidence being maximum below one year of age (N.I.C.D., 1984). Only 10.7% of the cases in the present study had severe diarrhoea and rest of the cases had

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mild to moderate degree of diarrhoea which clearly depicts that the cases which required specialised medical attention are very few and most of the cases can be tackled by simple measures of preventing dehydration. Recent studies have also indicated that most of the diarrhoea cases in the community are mild and about 10% of them may have dehydration and only 1 in 100 may require to be treated in health centre and hospitals (I.C.M.R.).

The diarrhoeal diseases accounted for 28.3% of total underfive deaths in the present study. The corresponding figure for U.P. worked out to be was 20.0% (Verma, 1986). However in Varanasi and Nilgiri the corresponding figures were 47% and 44% respectively (N.I.C.D., 1984). The overall preschool mortality in U.P. was 20/1000 with a diarrhoeal disease death rate of 4/1000 (Verma, 1986) as against 25.2/1000 and 7.1/1000 respectively in the present study.

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A Critical Analysis of the National Goitre Control Programme

M. A. Khan¹ M. Yunus² and Vinod Kumar³

The two most prominent goitre endemic areas in the world are the mountainous belts of the Andes in South America and the Himalayas in South East Asia of which the latter is undoubtedly the largest and worst affected area in the world.

In India today, we have all the possible weapons of hope against this large scale nutritional problem but even then it continues to not only occur but also expose and affect a major chunk of our population. Some of our hopes are related to the following facts :

The problem is preventable. We launched the National Programme in 1962, meaning thereby that it has already celebrated its Silver Jubilee. A potent and affective weapon iodised salt exists. Salt is a commodity which is consumed universally without wide variations. The cost of prevention through the use of iodised salt is only Rs. 0.50 or 0.05 Dollars/Year (WHO-1985). Government has now given every possible facility for the manufacture of iodised salt. The funds for this programme have been increased from Rs. 0.8 crores in

in 6th plan to Rs 20 crores in 7th plan, an increase by 25 times. The control of goitre is also included in the 20 point programme.

Unfortunately the problem is now also being reported from areas far away from the Sub-Himalayan region such as the states of Kerala, Gujrat, Karnataka, Madhya Pradesh and Andhra Pradesh. In fact there is no state in India today (NIHFW 1989) which does not have the problem of iodine deficiency and endemic goitre. It is for this reason that it is planned to have all the salt consumed in India iodised by the year 1992 and the problem controlled by 2000 A.D. (WHO 1985).

Some of the problems, shortcomings and adverse factors related to the National Goitre Control Programme are enumerated and discussed.

1. Since the inception of National Programme in 1962 the country has always lagged behind in the production of iodised salt in comparison to the actual needs, and production has been even lower than the theoretical capacity as is evident from the table 1. (WHO-1985).

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Table 1 : Requirement and Production of Iodised Salt.

Year	Actual production of Iodated salt (Lakh Tons)	Theoretical production	Iodated salt requirement
1978	1.06	3.76 Lakh Tons	10.0 Lakh Tons.
1979	1.20		
1980	1.22		
1981	1.29		
1982	1.23		
1983	1.20		

Till 1985-86 the production was hardly 2 lakh tons (Kapil 1986). In 1986 it rose to 6 lakh tons, in 1986-87 to 7.5 lakh tons and 1987-88 to 16 lakh tons. The targets for 1988-89 was 22 lakh tons, 1989-90-30 lakh tons and by 1992-52 lakh tons (Swasth Hind 1988). The sudden jump in the production after 1986 is due to the liberalisation of the policy of manufacture by private agencies and the announcement of government subsidy.

It is important to take note of the fact that from 1962-1985 (24 years) we were lagging far behind with regard to the production and distribution of iodised salt. We suddenly became active in 1986 and increased our annual production so as to meet the targets by 1992. This rapid increase in production may satisfy policy makers from the production point of view but what is the actual picture with regard to utilisation. Commonly used ordinary non-iodised salt is still available every where because of lax laws (even in endemic areas) and hence continue to be used because of their lower cost (WHO-1985). It is surprising that such a situation exists in spite of the fact that an amount of Rs 1.3 million was dis-

bursed to the iodised salt manufacturers as subsidy towards the cost of potassium iodate (NIHFW-1989). Increased production of iodised salt is therefore of no avail from the public health point of view unless non-iodised salt is banned simultaneously.

2. Awareness through organised and sustained Health education is still very poor in many endemic areas. To go on increasing its production without making the people (Consumers) aware of its importance and utilisation is useless.

According to a news item appearing in a national daily (Rai-1987), in many of the villages affected by Goitre in Deoria and Gonda Districts (U.P.), the people had not heard of iodised salt and those who had heard about it did not know from where to get it. In many instances even government doctors and medical practitioners were ignorant about the public health significance of goitre and the programme to control it (NIHFW-1989). To quote from well known study by the Nutrition Foundation of India (NFI-1983) "Indeed the process of education must start with public health personnel

including doctors. Doctors in charge of Primary Health Centres in the endemic state when specifically questioned do not list Goitre as a major public health problem and were themselves using non iodised salt. Lady Health Visitors themselves suffering from Goitre, were totally unaware of its implications". If this is the state of affairs of health personnel posted in endemic districts, what education of the masses and progress of the national programme can be expected from them. It is a tragedy that such a situation exists in spite of government claims that it has embarked a substantial amount of money to undertake an information, education and communication campaign in iodine deficient areas with the assistance of professional advertising agencies (NIHFW-1989).

Proof of the lack and in-effectiveness of Health Education is also evident from the following beliefs and practices prevalent in the country (Kapil—1986). In most communities in Uttar Pradesh and Bihar, Goitre in young girls is seen as a sign for her to get married. Some communities in Himachal Pradesh, Uttar Pradesh and Jammu and Kashmir have special neck ornaments designed to cover up the enlarged thyroid. Many women associate Goitre with pregnancy and child birth. When questioned in depth many women ascribed it to having screamed too much during childbirth or having been too voiceferous during pregnancy. The drinking of water with the head thrown back especially during pregnancy is also mentioned as a cause by several women.

3. The health authorities at Lucknow claimed that from June, 1987 iodised

salt will be available all over Uttar Pradesh and from October, 1987 there would be a total ban on the sale of common ordinary non-iodised salt (Rai—1987). The ban is still to be effectively implemented even today.

4. A four year old recommendation by health experts proposing the use of iodised oil injection to tackle the problem of Cretinism is yet to find acceptance by the Indian Government even though success has been reported and also demonstrated in Peru and Nepal.

The country's health keepers are yet to be convinced that Cretinism is an important problem even though we have 2.2 million cretins and 240 are being born every day (Pandav et al 1989). The then Union Minister of State for Health, Ms. Saroj Kharpade would only go as far to say—"The government was considering the All India Institute of Medical Sciences team's recommendations" while a senior official of the ministry remarked "We will consider iodised oil injection when the need arises".

There have also been some debates regarding the efficacy and cost of oil injections. Some workers of a study team were of the view that inspite of the administration of the injection some women still produced mentally retarded children. Others of the same team varified that this was so because the injections were given in 37th week of pregnancy, too late to prevent damage to the infants.

Another reason for avoiding oil injection is said to be its exorbitant cost. However

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according to UNICEF (Jain-1989) the total cost of such an injection along with Tetanus Toxoid to all iodine deficient mothers will only be Rs 3 crores which is just 1/7 of the allocated Rs 21 crores in 7th plan. Moreover according to Pandav, a member of the research team, only 3% of all women are pregnant at any given time.

5. There have been accusations that most of the iodised salt in the market (e.g. U.P. and Delhi) did not have the prescribed amount of iodisation (Hindu-1989). Report by the Nutrition Foundation of India (1983) indicates that the decision to iodise salt at 30 ppm. may be insufficient to prevent goitre and Cretinism. The report strongly recommends dose of 50 ppm as significant proportions of iodine are lost in transportation and storage. At room temperature, potassium iodate (used to iodate salt) loses 8.9% of its iodine in just 4 months (Deshpande-1989).

In Delhi random analysis of samples following complaints, revealed that even the variety marketed by a well known and reputed firm contained less than 15 ppm, a level which should normally be made available at the consumer end (Razada-1989). It has also been alleged (Hindu-1989) that iodised salt packets did not have the date of manufacture and expiry which were important due to deterioration of iodisation with time.

6. The government of India has given the highest political commitment to goitre by including it in 20 point programme (NIHFW-1989). The

government has also commissioned 8 technology missions in areas of high priority having time bound targets and said to be being constantly monitored by the Prime Minister (NIHFW-1989). One of these missions is related to the control of Iodine deficiency disease.

But even inspite of all this the performance of the programme is still very much short of expectations. Where then is the political will and commitment of the government which on one hand is giving subsidies to salt manufactures to meet the cost of potassium but on the other hand is turning a blind eye to the higher cost of such salt in the market and also not banning the sale of ordinary non-iodised salt (which is cheaper).

7. Even though Goitre is a problem to be found in varying proportions in all the states only 10 states have set up Goitre Control Cells in their Health Directorates. In spite of repeated requests from the Health minister States like Haryana, Punjab, Jammu & Kashmir, West Bengal, Tripura, Manipur, Himachal Pradesh, Kerala, Karnataka, Goa and Union Territory of Delhi and Chandigarh have not yet set up such control cells in their Health Directorates, even though many of these states lie in the sub-Himalayan Goitre belt and the centre has approved an assistance of Rs 1 lakh per state for setting up such cells (NIHFW-1989). The fate of the national programme is no better in the 10 states which have even set up such cells.

8. At the national as well as state level there is no comprehensive plan of action which defines the targets, time frame, and resource requirements. The budgetary allocation is therefore used in an adhoc manner (NIHFW—1989).

9. Of the 423 districts in India only 113 (28.3%) had been surveyed till 1986 (Data of Orissa and Tamil Nadu were not available) On analysis of the districts surveyed it was found that 28 had been surveyed even prior to 1962, 33 between 1962–1970 and 35 between 1971–1980. After 1980 only 17 districts had been surveyed till 1986 (NIHFW—1989). Thus there was an average of roughly 3 districts surveyed per year. However there were several years (Seven) when only one district was surveyed in that year. These facts show very clearly the rather poor haphazard and slow progress of the

National Programme relating to this component.

10. According to programme components a district should be resurveyed after 5 years of supply of iodised salt so as to assess impact. If we analyse the situation upto 1981 (an year in which all districts surveyed till then should have been provided with iodised salt and accordingly resurveyed by 1986 the year till which our information is available), we find that till 1981 only 55 out of 97 surveyed districts (56.7%) had been provided iodised salt and of such 55 districts only 14 (25.4%) had been resurveyed, thereby showing a gross discrepancy in this task also.

11. Of the 23 states for which data is available, the performance of different states as to the proportion of total district surveyed can be graded as follows :

Table 2 : Grading of Survey Performance of Various States

Grade of Performance	% Coverage (Criteria)	States	
		Number	Percentage
Excellent	100%	6	26.1
Satisfactory	80–99%	1	4.3
Fair	50–79%.	2	8.7
Poor	< 50%.	14	60.9

A Critical Analysis of the National Goitre Control Programme

It shows that 60% of states had a poor performance as regards survey. If this component of survey is calculated for the 15 states lying in the sub-Himalayan endemic belt rather high proportion was rated as having poor performance.

12. Ideally any district which is surveyed and reports endemicity of Goitre, (Prevalence rate more than 10%) and especially if this endemicity is high, should be provided with iodised salt as soon as possible so that the harmful effects are prevented. Very few districts have been provided with iodised salt within an year or two of their being reported endemic. Many were provided with iodised salt after 4 years, and some even after 36 years. It may be argued that how could the states surveyed before 1962 could do so, when the National Programme itself was started in 1962 i.e. after 32 years of the first survey held in 1930. In this regard it may be pointed out that if no national programme was available and salt could not be provided, then why was the survey done. This is against the principles and ethics of any screening procedure. When we examine the aspect of re-survey after 5 years of iodised salt supply it's found that very few were resurveyed within the stipulated 5 years,

the actual time taken ranging from 8-18 years.

It is expected that prevalence rate should decrease after supply of iodised salt. This is so for many districts but there are also 5 districts where prevalence rate had increased on re-survey and this increase ranged from 1.1%—36.5%.

13. If we analyse the control programme in relation to those districts where a prevalence rate of more than 50% has been reported the picture is also very gloomy. Available data indicate that there were 8 such districts according to surveys carried out till 1986 (NIHFW—1989).

- (a) It is highly unfortunate that in 4 of such districts (50%) the commencement of iodised salt supply had not yet begun by 1986 i.e. even after 2, 3, 8 and 13 years after the baseline surveys had been done.
- (b) In the remaining 4 districts where iodised salt supply had been provided, the time interval between the survey and the commencement of salt supply was ranging from 3-8 years and only one such district had been re-surveyed after 5 years of iodised salt supply.

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