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Prevention And Control Of Goitre

Demerits Of Iodised Oil Injections

N. Kochupillai

Iodised oil injection as an alternative strategy for the prevention of endemic goitre was introduced by McCullagh in New Guinea in 1957. He showed[4,7] that the injection of 4 ml of iodised oil, containing 2.15 gram of elemental iodine, ensured the correction of severe iodine deficiency for as long as 4.5 years and reduced the incidence of goitre. Since endemic populations in New Guinea belonged to far-flung and isolated terrains, salt iodation as a means of iodine prophylaxis was thought to be logistically difficl:~rherefore, a large-scale iodised oil injection prophylaxis (IOP) was mounted, involving thousands of injections. In this presentation, an attempt will be made to review relevant data on the merits of this approach.

PHARMACOLOGY AND TOXICOLOGY OFOIL

The most widely advocated and used iodised oil preparation is the Lipiodol brand of iodised poppy-seed oil put out by Guebert, Paris. It is a clear pale yellow fluid which is reported to have a specific gravity of 1 .2080 and viscosity of 0.5 to 1.0 poise at 1 5°CB. It contains 37 to 38 percent iodine (WVVOI)B,17. Though the iodine in Lipiodol is reported to be in covalent linkage[B], in our experience, on opening th.e 10 ml vials and exposing to atmosphere, the solution soon turns deep brown, due presumably to the release of free iodine. The chemical nature of iodised oil is believed to be variously iodinated ethyl esters of fatty acids that constitute poppy-seed oilB.

Virtually nothing is reported regarding the bio-chemical specificity of the different iodinated fatty acids and other compounds that constitute Lipiodol. Also, virtually no data are available on animal toxicological studies (acute and chronic) involving Lipiodol. Specific questions relating to the acute and chronic toxic effects, as well as the teratogenic potential of hetro-poly iodised fatty acids, cannot be answered without carefully done animal toxicological studies. Such questions are of direct relevance to the IOP programme, in view of the recent suggestion that iodis~d oil be introduced as a component of the maternal and child health programme, involving administration to pregnant mothers and new borns!

Much of the published information on the pharmacology of Lipiodol relates to its pharmaco-kinetics. The most significant contribution in this regard has been that of Pretell *et aP*. Using 1-131 labelled Lipiodol, Pretell demonstrated that 99.3 percent of 1-131 was covalently bound to the oil. However, when 1-131 labelled oil was incubated with human serum in 1: 1 00 dilution at 37"C, progressive deiodination was demonstrable. By this process, as much as 13.2 percent of 1-131 was deiodinated by 15 hours of incubation. Their studies also showed that during the same perjod as much as 6.7 percent iodinated Lipiodol was incorporated to serum proteins or serum lipoproteins.

Studies in rats given *11M* Lipiodol 1-131 show that as much as 87 percent of radioactivity was retained at the *11M* site 23 days post-injection. During the same period 8 percent radioactive 1-131 appeared in urine and 0.2 percent was concentrated in the thyroid. These studies also showed that besides thyroid, which concentrates the maximum proportion of released iodine, other tissues such as adipose tissue, kidney, lymph nodes, salivary gland, lungs and liver also take up and retain the released iodine, presumably in the form of iodated fatty acids. As fatty acids get incorporated both in depot fats and membrane structures in the body, these observations are of importance, particularly from the point of view of toxicity to the developing child in utero.

Malamos *et af*[5] using 1-131 labelled Lipiodol, followed the disappearance of 1-131 from injection sites. According to their computations, the biological half life of 1 ml injected Lipiodol was-70 days. The disappearance was found to be linearoverthis period of time. Malamos *et at* also found 1 percent of the dose of administered 1-131 in the thyroid by day four, and as much of 30 percent was absorbed from the injection site by day 28 post-injection.

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The type of metabolic transformation that occurs to injected iodised oil in the body is not known. In what form it is dispersed from the injection site is also not known.

The pattern of urinary iodine excretion (UIE) by subjects who received IOP has been studied by more than one author. One of the earliest studies in this regard was reported by Pretell on the basis of measurements done in two subjects[17]. One of them received 0.2 ml Lipiodol while the other received 2.0 ml 1/m. Pretell found identical linear slopes of I-131 excretion in these two subjects, with half-lives of 5.6 months. However, in this study, the first point of UIE estimation done following IOP was six months post-injection and therefore no quantitative data was available on early phase iodine excretion following IOP. In a subsequent study[17], the same author reported a rapid increase in UIE from control values of 40 µg/24 hour to almost 10 mg/24 hour, which then declined to less than half of this value in day 30 post-injection. UIE subsequently stabilised to a slow exponential rate of excretion; keeping up satisfactory UIE levels for as long as 60 months post-injection (Figure 1). Thus a close follow-up study on the pattern of UIE following IOP showed a pattern of multiple exponential excretion with an early phase of massive rapid iodine excretion and a late phase of slow and minimal iodine excretion. In a study done on 10 goitrous subjects (Figure 2) who received 1 ml iodised oil injection at AIIMS, we could demonstrate high levels of UIE ranging up to 10 mg/24 hour for as long as four to six weeks with subsequent decline to more physiological levels of UIE daily[11]. Similar findings have been reported by Thilly *et al* from Zaire[18].

Pretell[17] has analysed the chemical nature of iodine excreted in the urine following IOP and has concluded that 70-80 percent is accounted for by inorganic iodine and the remaining as organic iodine. The nature of organic iodine excreted in the urine following IOP is not clear. *There is, thus, consensus in literature that following a 1 ml injection of Lipiodol, pharmacological levels of inorganic iodine are excreted daily by the subjects for as long as six to 12 weeks.*

EFFICACY OF IOP

Ever since its successful initial trial in New Guinea, millions of iodised oil injections have been administered as prophylactic measure to prevent endemic goitre and cretinism in developing countries such as Indonesia, Nepal, Ecuador, Peru, Argentina and Zaire. There have been studies to assess the efficacy of this measure, mainly from the point of view of preventing goitre and cretinism prevalence.

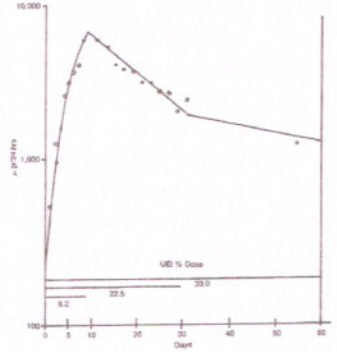
The impact of IOP in reducing the prevalence of endemic goitre and improving iodine and thyroid status of people in the various endemics of the three continents where it has been used has been impressive. However, available data do not show that IOP has eradicated endemic goitre or cretinism from any area of prophylaxis. Also, limited studies on acute effects of IOP in the immediate post injection phase show that in a significant number of subjects, an increase in TSH levels and a decline in T_4 levels occurred[5]. These, however, may be transient. Most of the studies report an absence of any significant toxic complications following IOP. However, there is paucity of any systematic studies to underscore this 'impression'.

IOP AND PREVENTION OF ENDEMIC CRETINISM

Though endemic goitre is etiologically linked with nutritional iodine deficiency in most of the endemics of the world, the relationship between iodine deficiency and endemic cretinism was not clear till the studies of Pharoah and Hetzel in the Jimi River district of western New Guinea in 1966[15]. The results of this study, involving a controlled trial of iodised oil injection to prospective mothers, are summarised in Table 1. Based on these results, Pharoah and Hetzel concluded that "intra-muscular injection of iodised oil was effective in the prevention of endemic cretinism, but that to be effective it had to be given prior to conception"[15].

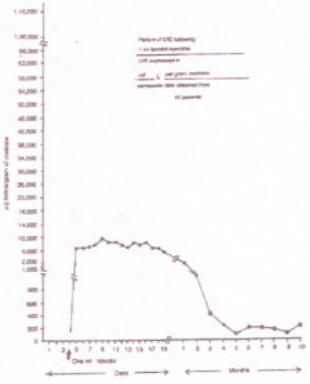
Subsequent to this, Flerro-Benitez

Figure 1
E.A. Pretell's study



Early urinary losses of iodine following the injection of 1.0 ml (475 mg I) of iodised oil.

Figure 2
Urinary Iodine Excretion (UIE) — AIIMS study



and it is known as the Wolf Chaikoff effect. Though normally this is a transient and reversible phenomenon, in several clinical situations, and particularly in predisposed individuals, 'excess' iodine is well recognised to cause hypothy roidism'.

Croxon *et a/*[5] have published evidence to show that during the acute post-iodation period following IOP in the Himalayas, TSH levels increased and $T_4$1evels decreased in a significant proportion of subjects studied, indicating the susceptibility of the hyperstimulated endemic goitrous gland to iodine-induced suppression. Braverman has adduced experimental evidence'6 to show that foetal and neonatal thyroids are particularly prone to prolonged inhibitory effect by excess iodine and this fact is further borne out by the large number of reports in literature on iodine-induced neonatal hypothyroidism'. Indeed, Braverman, in the recent edition of a leading textbook on "The Thyroid" has cautioned against exposing pregnant women and new-borns to excess iodine'.

Iodised salt (ISP): The above insights led us to another study to assess the efficacy of physiological supplementation of iodine through provision of iodised salt (ISP) to pregnant mothers in the same PHCs and under identical conditions in which we did the IOP studies'2. The results of the (IOP and ISP) studies, summarised in Table 2, clearly demonstrate the superiority of physiological levels of iodine supplementation to pregnant mothers in reducing the incidence of NCH in iodine deficient goitre endemias.

Intra-uterine hypothyroidism has been thought to be important in the causation of neurological defects characteristic of endemic cretinism. In view of this, the observed failure of intra-pregnancy IOP to correct intra-uterine hypothyroidism may well be responsible for its reported inefficacy in preventing neurological cretinism. Besides, in view of the published evidence in literature, cited above, showing prolonged toxic inhibition of iodine deficient foetal/neonatal thyroid, another possible mechanism can be evoked to explain the phenomenon, namely induction of intrauterine hypothyroidism by the 'excess' iodine release following IOP. Indeed, both these mechanisms may be operative in the iodine deficient intra-uterine milieu, to cause prolonged foetal hypothyroidism and hence cretinism. *The practice of IOP in pregnancy is, thus, unjustifiable on two counts:* (1) *because of its proven inefficacy in preventing cretinism and the high incidence of NCH; and* (2) *because of its toxic potential due to early excess iodine release.* The latter is undesirable not only because of its effect in causing toxic inhibition of iodine deficient foetal thyroid, but also because of its reported adverse effect in triggering autoimmune thyroiditis.

CONCLUSIONS

- The pharmacology of iodated oil is incompletely understood[4]. No animal toxicological studies are available to assure us of the safety of this preparation from the point of view of its toxicity or teratogenecity. According to the recently adopted 'Y' schedule of the Drugs and Cosmetics Act of the Government of India, before any "new drug" is to be introduced into the country, it has to undergo extensive Phase I and Phase /I trials within the country. By definition, a "new drug" means not only a new formulation, but also old formulations with newly recommended use. Iodised oil falls in this category because originally it was used only as a radioopaque compound for diagnostic imaging (bronchography).
- No systematically and scientifically documented studies are available to establish the safety of iodised oil, when used in man. All that is available are brief casual and off-the-cuff statements on 'safety' without any data to support them.
- On the basis of available pharmacokinetic studies[7,8], there is a phase of excessive (pharmacological) iodine release following iodised oil administration. This phase lasts for as long as six to eight weeks. There is ample evidence in literature showing that excess iodine can cause hypothyroidism particularly among new borns from iodine deficient areas'3. Experimental studies also reveal the same[17]. It is also recognised that hypothyroidism, even if transient, can cause damage to the developing brain of the child in utero, or during the immediate postnatal period. In view of this, more than one internationally published textbook cautions against exposing pregnant women and new-borns to excess iodine '3,". Therefore iodised oil should not be used as a measure of iodine prophylaxis in any maternity and child health programme.
- There are several published reports in literature to show that iodised oil, when given during pregnancy, does not prevent cretinism[2,3]. Studies in India show that iodised oil injections, when given in pregnancy, do not reduce the high incidence of neonatal chemical hypothyroidism in iodine deficient population'9. These two observations, when coupled with the recognised toxic suppression of thyroid function by excess iodine (see the third point above) make iodised oil prophylaxis an undersirable and ineffective measure, at least from the point of view of preventing the most sinister health consequence of nutritional iodine deficiency, namely neonatal thyroid failure.
- The universally accepted and physiological method of iodine prophylaxis is salt iodation. There are no two opinions on this. In keeping with this, the Government of India has approved, and is implementing, a policy and programme of salt iodation in India. Careful monitor- 'ing and evaluation of this ongoing programme in Uttar Pradesh (U.P.) show satisfactory iodine availability through salt in 50 of the 56 districts so far monitored. The urinary iodine excretion pattern among people in U.P. has also improved and the incidence of neonatal chemical hypothyroidism in the iodation deficiency disorders (100) affected districts of U.P. has come down from 99 per thousand birth to 18 per thousand birth'4.

These welcome indicators tell a story of the success of ongoing salt iodation in preventing nutritional iodine deficiency (NIO) and 100 in India. Therefore the most rational approach to prevent NIO and 100 in India is to effectively implement the ongoing policy and programme of iodation of edible salt with the help of a carefully organised network of monitoring and evaluation system, e:-,-compassing all the known endemic districts of the country. Any alternative programme of iodine prophylaxis is relevant only in the context of the proven failure of the ongoing programme, on the basis of a careful monitoring and evaluation. To fritter ~lway available resources by ad hoc adoption of alternative measures of questionable relevance (see the fourth point) is unwise, to say the least.

It is significant that no developed country of the western industrialised world has used iodised oil prophylaxis as a measure to prevent NIO and 100, even though prevalence of endemic goitre and 100 is continuing to be reported (eg., Sicily, Italy and West Germany).

- For the above reasons, there is no justification whatsoever to adopt Iodised oil as an alternative strategy for the prevention of goitre in our country.

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Reviews and Comments

Prevention And Control Of Goitre On Iodised Oil Injections

C. Gopalan

In attempting the control of goitre, or indeed of any other major public health problem, we should carefully avoid falling into the trap of opting for technologies which are not sustainable within our own means - technologies for the continued application of which we will have to be forever dependent on external donors. Relatively inexpensive, and proven technologies well within our means, resources and competence, are now available for the elimination of most of our major public health problems.

The inexpensive technology, a time honoured and time-tested one, for the control of goitre, is the iodation of common salt. Programmes for goitre control must squarely and solidly rest on this technology. Unfortunately the implementation of this strategy has been tardy and inefficient. Either the salt is not properly iodated, or adequate amounts of it are not made available in time to the needy populations, or the programme is unfortunately allowed to run into needless controversies such as "universal iodation" versus "iodation limited only to endemic zones". These are deficiencies in implementation and not in the technology; these deficiencies must .be resolutely overcome, and should not be allowed to be used as excuses or arguments for an alternative technology.

There is a strong case for the setting up of an empowered National Goitre Commission which can help to achieve inter-sectoral coordination and expeditious implementation of goitre control programmes as a unified operation with the mandate of achieving the eradication of the disease before the turn of this century. This is specially important as new endemic areas seem to be emerging in the irrigated plains of some Asian countries.

Iodised oil injections: Periodic parenteral administration of iodated oil (not presently manufactured in any Asian country) has been suggested as an alternative approach, especially in areas "inaccessible" to common salt.

It is difficult to imagine of any areas in our country which are now "inaccessible" to common salt, but which will become readily "accessible" to iodated oil, to thousands of disposable syringes, and to an army of "injectors"! Apart from the apprehensions in this regard voiced earlier' and the increased expense and the unnecessary drain on meagre foreign exchange resources that this approach would inevitably involve, and apart from the valid arguments against this approach ably presented by Kochupillai in the foregoing article, it must also be remembered that we are now facing two major problems which could get compounded to disastrous proportions through the use of the periodic parenteral administration of iodated oil as a large scale public health operation, namely, the problem of AIDS and hepatitis.

There has been a steep rise in the HIV seropositivity rate among drug addicts of North East India during the last two years. Thus the data of the Indian Council of Medical Research show that half the drug users in this region, which is also precisely the area which is highly goitre-endemic, were seropositive in 1990. Those familiar with real-life situations in the field will realise that "disposable" syringes will not be dutifully "disposed"; under the circumstances, the consequences of resorting to a technology which is dependent on repeated injections (using "disposable" syringes) could be disastrous.

Resorting to large-scale iodated oil injections in the present context would involve unnecessary risks which no responsible health administrator in India should take. It will also be unethical on the part of powerful commercial houses of Europe and "international agencies" to push Asian countries into a technology which does not confer any special advantage over the far less expensive and indigenously available technology of salt iodation; and which could eventually also prove disastrous.

Kochupillai points out in the foregoing article that no developed country of

the western industrialised. world (including Italy, Switzerland or West Germany which encounter goitre problem) has used or presently proposes to use, iodised oil injections for goitre control. It is alsosignificant that those who seek to actively promote this approach in the Third World have not dared to do so nearer home! It is almost as though this approach is "reserved" for the Third World. The message is clear. Prudence and national interests dictate that we resolutely stick to salt iodation, disregarding signals and sounds to the contrary.

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NUTRITION NEWS

The XIV Annual Meeting of the Nutrition Society of India will be held on December 14-15,1991 at Lucknow.This meeting also marks the conclusion of the SilverJubilee celebrations of the Society. The Silver Jubilee lecture will be delivered by Dr. M.S. Swaminathan, the Fifteenth Gopalan Oratiqn by Dr. Vernon Young and the Dr. Srikantia Memorial Lecture by Dr. B.N. Tandon. There will be Symposia on 'Biotechnology and Nutrition' and 'Diets in Therapeutics'. Free Communication papers have been invited on 'Community Nutrition' and 'Experimental Nutrition' from young scientists. Awards will be presented to the best papers.

The Kamala Puri Sabharwal lecture on "Planning for better health" will be delivered in the second week of December by Dr. Haricharan at the Lady Irwin College, New Delhi.

Dr. C. Gopalan, President of the Foundation will deliver a lecture on "Nutrition and Growth" at the Royal College of Physicians, Edinburgh on November 21 and a lecture at the McCarrison Society on "Food and Health - McCarrison's Prescription Endures" on November 23 at Glasgow. '

Studies On Colostrum Nutrients And Immunologic Factors

Kunal Saha and Meenakshi Garg

This paper presents data from a series of our studies on colostrum from mothers in North India. These include: (1) our studies on the output of colostrum and its nutrient composition with respect to protein, fat, vitamins and trace elements; (2) the results of a detailed study of the cellular as well as humoral immunologic agents in colostrum, and (3) observations on how human colostrum can be successfully used in the management of chronic infantile diarrhoea.

Studies on colostrum were carried out on 65 women drawn from poor socio-economic groups. Their diets provided on an average about 2,050 calories, 60 gm protein and 90 gm fats. Contrary to general expectation, the average intake of fat by these mothers was quite high. Lactating mothers in the community were apparently consuming more edible oils and ghee than their non-lactating counterparts.

NUTRIENT COMPOSITION

The volume of colostrum in 12 hours was 32.28 ± 7.92 ml in mothers with preterm babies and 44 ± 4.83 ml in mothers with full-term infants. The difference was significant ($p < 0.05$).

The nutrient composition of colostrum is indicated in Table 1.

The colostrum vitamin A content as shown in Table 1 was just half the values (of1331.U.,153l.U.,and201l.U.per100 ml) reported in some studies from the U.S.A. and England[7,9.11].

Table 1

Nutrient composition of colostrum

Protein	5.36 g/dl 5.4
T riglycerides	g/dl 67.5
Cholesterol	mg/dl 36.36
Phospholipid	mg/dl
Vitamin A	61.2l.U.ldl
Vitamin E	1180 Ug/dl
Calcium	0.996 g/dl
Magnesium	0.053 g/dl
Copper	0.307 mg/l
Zinc	3.9 mg/l
Iron	0.42 Ug/l

ANTIMICROBIAL FACTORS

Human colostrum contains various non-immune and immune antibacterial, antiviral and antiprotozoal agents, in addition to several harmless microorganisms[12]. In an earlier study we had found that colostrum from lepromatous mothers contained leprosy bacilli[15].

Human colostrum is rich in nonSpt7 cific antimicrobial agents such as lacto~ ferrin and lysozyme. Lactoferrin is an iron binding protein, which inhibits the proliferation of iron binding micro-organisms in the gut. The mean level of lactoferrin and lysozyme in human colostrum was found to be 0.84 mg/ml and 5.4 mg/l respectively.

Of the five classes of immunoglobulins, the colostrum samples studied were found to be the richest in secretory Ig A (338.8 mg/dl) though the concentration was less than that reported from colostrum of mothers of developed countries [14]. IgG and IgM c~ncentrations were 62 mg/dl and 61 mg/dl respectively.

ANTITOXINS AND ANTIBODIES IN HUMAN COLOSTRUM

In yet another stud[y5], we were able to demonstrate antibodies against enteropathogenic *EColi* exotoxin in human colostrum using the rabbit ileal loop technique. Table 2 shows the presence of both O and H agglutinins against S-typhi in the colostrum samples of Indian mothers. The concentrations of the agglutinins varied from 1.5 to 2.4 log titres. These agglutinins mostly belonged to IgA Class[5] (Table 3).

The neutralising antibodies against polio virus (types I,II, and III) were studied in 22 colostrum samples taken from full-term mothers (Table 4). The percentage of positivity was the maximum against type II poliovirus (90.9 percent) and least against type III virus (67.9 percent). These results indicate the presence of adequate antibodies against poliovirus in the colostrum samples of Indian mothers, which suggested subclinical polio infection in the community. The average age of our mothers being 24 years, perhaps vacci-

nation against polio was not available during their childhood. These results provide a further strong argument in favour of breast feeding.

Haemagglutination inhibition antibodies against the measles virus were found in 57.4 percent colostrum samples (Table 5). The presence of the measles antibody in the colostrum samples of these mothers indicates that breast feeding might reduce measles infection in our children. However, this is yet to be proved. Although these mothers were immunised in the last trimester' of pregnancy, we could not detect the neutralising antibody against tetanus in any of the colostrum samples. These results show that newborns could not be protected against neonatal tetanus by breast feeding[5].

T CELL SUBSETS

In an earlier study of ours'4, we had reported the cellular counts in 66 human colostrum samples. In a subsequent study five years later on 30 colostrum samples'6, we found considerable variance in cellular counts as compared to our earlier findings - an observation which is in accordance with the wide range of reported values for different cellular constituents of colostrum in the literature. Analyses of our data show that the lymphocyte percentage of total cells in the colostrum was 36.6, while the T_3 and B cell percentage (of total lymphocytes) were 46.55 and 31.37 respectively. Thus about 50 percent of lymphocytes in human colostrum were T lymphocytes. Out of the total T_3 cells in colostrum, the percentages of T 4 and T 8 cells were 35.6 (6.9 - 83.2) and 29.5 (10.7 - 79.2) respectively and the *TiT* 8 ratio varied from 0.1 to 6.6 with a mean of 1 .98's. In an earlier study, Bhaskaran and Reddy (1981)2 had demonstrated the bactericidal activity of milk leukocytes irrespective of the stage of lactation.

CELLS AND IMMUNOGLOBULIN LEVELS

The mean IgG level in the colostrum samples of primiparous mothers (22 mg/dl) was higher than that (11 mg/dl) in the grand-multiparous mothers. These results are supportive of the claim that mothers had specified anti-foetal cell mediated priming as a result of repeated pregnancies'8.

"PRETERM" AND "FULLTERM" COLOSTRUM

Previous studies had demonstrated higher levels of protein, fat, sodium, chloride, magnesium and iron in preterm as compared to fullterm colostrum samples'o. Lactose content was found to be lower in preterm colostrum[5] while Lemons *et a/'o* had reported lactose levels to be comparable in both the groups of colostrum. Anderson *et all* did not find any difference in the energy content in the two groups and attributed the difference to the volume of breast secretions. Recently Dwarkadas *et a/* [3] had compared the levels of the anti-infective proteins and immunoglobulins in the preterm (33 weeks) and fullterm (39.1 weeks) colostrum samples. The mothers of both the groups had comparable age (23.8

Table 2

Agglutinins against S. typhi in colostrum studied by Widal test

Sample (n)	Antibody	Number and (%) of samples showing positivity at various titres							
		1:2	1:4	1:8	1 :16	1:32	1:64	1 :128	1:256
Colostrum(29)	Anti-O	21	27	27	18	15	12	9	1
		(72.4)	(93.1)	(93.1)	(62.1)	(51.7)	(41.4)	(3.5)	(3.5)
	Anti-H	14	14	14	10	6	1	1	1
		(48.3)	(48.3)	(48.3)	(34.5)	(20.7)	(3.5)	(3.5)	(3.5)

Table 3

Immunoglobulin classes of colostrum antibody to S. typhi studied by immunofluorescence technique

Samples' (n)	Number of negativity (%)	Number of positivity (%)					
		IgG	IgA	IgM	All three Igs	IgG and IgA	Ig and IgA
Colostrum (29)	8	10	10	3	1	4	3
	(27.6)	(34.5)	(51.7)	(10.3)	(3.4)	(13.8)	(10.3)

• *Colostrum was diluted* 1: *10*

Antibody against S. *typhi in colostrum is predominantly IgA class.*

Table 4

Levels of neutralising antibody (NA) against polio types I, II and III virus in colostrum

Sample (n)	Qualitative and quantitative study of antibody	Neutralising antibody against types of polio virus in colostrum		
		I	II	III
Colostrum (22)	(a) % positfvity'	77.25	90.90	67.90
	(b) Log titre mean + SO (range)	1.10 (0-1.5)	1.25 (0-1.5)	0.95 (0-1.5)

• *Positivity mean titre of neutralising antibody is* 1:24 *and above.*

Table 5

Levels of haemagglutination inhibition antibodies against measles virus in colostrum

Sample (n)	Number of samples and (%) showing positivity' at log titre (reciprocal)					
	0.30	0.60	0.90	1.20	1.51	1.81
Colostrum (54)	31	31	27	18	12	5
	(57.4)	(57.4)	(50.0)	(33.3)	(22.2)	(9.25)

• *Positivity at* 1:4 *(0.60 log titre) and above .*

status was comparable too. The mean volume of colostrum produced in 12 hours was 32.28 ml in preterm mothers, which was less than that (44 ml) in full term mothers. The protein and cell contents in the preterm colostrum sample were more than those in the full term samples. Preterm colostrum samples were richer in anti infective agents as well as cell contents than the full term colostrum.

USE IN THE TREATMENT OF CHRONIC INFANTILE DIARRHOEA

It has been suggested that breast feeding protects infants against septicaemia in the immediate postnatal period and the administration of colostrum prevents otherwise uncontrollable epidemics of E *Coli* diarrhoea in new-borns. These reports prompted us to treat infants suffering from chronic diarrhoea, caused by enteropathogenic ECo/i, with only colostrum feeding[17]. Eight infants with mean age of 27 months having diarrhoea for three weeks or more and having recurrent episodes of loose motions (more than six episodes in three months) were included in the study. Breast fed babies were excluded. Of these eight babies, three had grade one; three had grade two; and the remaining two had grade three undernutrition. (Most children were marasmic though none had kwashiorkor.) The most common serotypes of enteropathogenic E *Coli* in their stool were 026 and 018. Four infants had associated ascariasis and one infant had associated giardiasis. In addition to the colostrum feeding (10 ml twice a day), they were given specific antiparasitic treatment. Food was not restricted unless diarrhoea was present. Dehydration, if present, was corrected. All patients were followed clinically for three months. Stool samples were re-examined bacteriologically. Of the eight patients receiving colostrum, six had clinical remission and showed remarkable response to oral colostrum feeding. The nutritional deficit disappeared. Even after repeated examinations the stools showed no pathogenic *ECO/Pl.*

To our knowledge this is the first study attempting the treatment of chronic infantile diarrhoea using human colostrum. However, earlier, Hanson and associates (1978)8 had documented the presence of specific IgA against enteric antigens. We have demonstrated anti-body against enteropathogenic E *Coli* 5 in human colostrum, which might have neutralised the toxin in the gut of the patients. Narayanan *et a/* (1982)13 have also earlier reported significantly less infection in low-weight babies who were administered expressed milk.

Though colostrum therapy seems to be attractive and promising, there are some practical problems. Nearly threefourths of Indian mothers discard colostrum, because they think that it is dirty and not good for their babies. There may also be some technical hur.dles,such as the collection of pathogen-free samples and storage. Our studies suggest that, where facilities are available, pasteurisation of human colostrum and its subsequent preservation in a milk bank at low temperatures for use in appropriate cases, may be desirable.

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NUTRITION NEWS.

The Sixth Asian Congress of Nutrition was held from September 16-19, 1991 at Kuala Lumpur, Malaysia. The Conference, presided over by Dr. Chong Yoon Hin, was attended by nearly 800 delegates drawn from about 40 countries.

The Scientific Programme included Plenary Lectures, 20 Symposia, 24 Free Communication Sessions and 26 Poster Sessions. The scientific sessions were informative and of good scientific stan· dard. The organisational arrangements were excellent. By all accounts the Congress was highly successful. The Federation of Asian Nutrition Societies accepted the invitation from China to hold the Seventh Asian Congress of Nutrition at Beijing in September 1995.

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