CENTRE

International Centre for Diarrhoeal Disease Research, Bangladesh

Memorandum

To: Professor Mahmudur Rahman
Chairman, Ethical Review Committee

Thru: Division Director, CSD

From: Dr. S.K. Roy
CSD

Date: November 3, 1999

Sub: Protocol #99-022

Thank you very much indeed for providing me with the comments of Ethical Review Committee on my protocol entitled "Clinical trial of zinc in cholera patients". As suggested by you we have modified the protocol incorporating the observations of the ERC members. The changes made are as follows:

1. The words 'metabolic balance' (page 3, para 2, line 10) have been replaced by the words 'fluid balance'.
2. The word 'recovery' (at page 3) and English and Bangla consent forms are modified.
3. Clinical recovery is the same as cholera resolves and no dependent on the stool culture report. Repeated cultures are mentioned in the protocol, in abstract summary and at pages 3, 10, and 12.
4. Composition of syrup is given at page 9.

Enclosed please find a copy of the revised protocol for your approval.

Encl: a/a

INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH
Mail : ICDDR,B, GPO Box 128, Dhaka-1000, Bangladesh
Phone : 871751-60, Telex : 675612 ICDD BJ
Fax : 880-2-883116, 886050, 871568, 871686, Cable : Cholera Dhaka

CENTRE
FOR HEALTH AND
POPULATION RESEARCH

Memorandum

14 October 1999

To : Dr. S. K. Roy
Clinical Sciences Division

From : Professor Mahmudur Rahman
Chairman, Ethical Review Committee

Sub : Protocol # 99-022

The Ethical Review Committee met on 6th October 1999 and considered your protocol # 99-022 entitled "Clinical trial of zinc in cholera patients". After discussion in the meeting the Committee made the following observations:

a) the words 'metabolic balance' at page 3 (para 2 and nine 10) should be replaced with the words 'fluid balance'.

b) the word 'recovery' at page 3 and in the English and Bangla consent forms should be elaborated further.

c) the PI should clearly mention whether the clinical recovery is the same as "cholera resolve" or does it mean a negative stool isolation for 3 consecutive days as has been the definition of "cure" in earlier studies. Repeated cultures are not mentioned in the protocol.

d) at page 9, the composition of syrup should be provided.

You are, therefore, requested to modify the protocol incorporating the above observations and **resubmit** a revised copy for further consideration.

Thank you.

Copy:- Division Director
Clinical Sciences Division

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CENTRE
FOR HEALTH AND
POPULATION RESEARCH

26 September 1999

Memorandum

To : Dr. S. K. Roy
Clinical Sciences Division

From : Professor V. I. Mathan
Chairman, Research Review Committee

Sub : Protocol # 99-022

This has reference to your memo of 6th September 1999 in response to my memo of 23rd August 1999 regarding the roles of collaborating investigators for your protocol # 99-022 entitled "Clinical trial of zinc in cholera patients". I am pleased to inform you that the protocol is hereby approved upon your appropriate addressing of the observations made by the Research Review Committee in its meeting held on 10th August 1999.

Thanking you and wishing your success in running the protocol.

copy:- Interim Head
Clinical Sciences Division

APPROVED COPY

(FACE SHEET) **ETHICAL REVIEW COMMITTEE, ICDDR,B.**

Principal Investigator: Dr. S.K. Roy

Application No. 99-022

Title of Study: Clinical Trial of Zinc Supplementation in Cholera patients

Trainee Investigator (if any): _____

Supporting Agency (if Non-ICDDR,B) _____

Project Status: _____

[✓] New Study

[ ] Continuation with change

[ ] No change (do not fill out rest of the form)

Circle the appropriate answer to each of the following (If Not Applicable write NA)

1. Source of Population:
   - (a) Ill subjects — Yes No
   - (b) Non-ill subjects — Yes No
   - (c) Minor or persons under guardianship — (Yes) No

2. Does the Study Involve:
   - (a) Physical risk to the subjects — Yes (No)
   - (b) Social risk — Yes (No)
   - (c) Psychological risks to subjects — Yes (No)
   - (d) Discomfort to subjects — (Yes) No
   - (e) Invasion of privacy — Yes (No)
   - (f) Disclosure of information damaging to subject or others — Yes (No)

3. Does the Study Involve:
   - (a) Use of records (hospital, medical, death or other) — (Yes) No
   - (b) Use of fetal tissue or abortus — Yes (No)
   - (c) Use of organs or body fluids — (Yes) No

4. Are Subjects Clearly Informed About:
   - (a) Nature and purposes of the study — (Yes) No
   - (b) Procedures to be followed including alternatives used — (Yes) No
   - (c) Physical risk — (Yes) No
   - (d) Sensitive questions — (Yes) No
   - (e) Benefits to be derived — (Yes) No
   - (f) Right to refuse to participate or to withdraw from study — (Yes) No
   - (g) Confidential handling of data — (Yes) No
   - (h) Compensation &/or treatment where there are risks or privacy is involved in any particular procedure — (Yes) No

5. Will Signed Consent Form be Required:
   - (a) From subjects — Yes No
   - (b) From parents or guardian (if subjects are minor) — (Yes) No

6. Will precautions be taken to protect anonymity of subjects — (Yes) No

7. Check documents being submitted herewith to Committee:
   - ___ Umbrella proposal - Initially submit an with overview (all other requirements will be submitted with individual studies
   - ✓ Protocol (Required)
   - ✓ Abstract Summary (Required)
   - ✓ Statement given or read to subjects on nature of study, risks, types of questions to be asked, and right to refuse to participate or withdraw) (Required
   - ___ Informed consent form for subjects
   - ✓ Informed consent form for parent or guardian
   - ✓ Procedure for maintaining confidentiality
   - ___ Questionnaire or interview schedule*

* If the final instrument is not completed prior to review, the following information should be included in the abstract summary

1. A description of the areas to be covered in the questionnaire or interview which could be considered either sensitive or which would constitute an invasion of privacy
2. Example of the type of specific questions to be asked in the sensitive areas
3. An indication as to when the questionnaire will be presented to the Committee for review

We agree to obtain approval of the Ethical Review Committee for any changes involving the rights and welfare of subjects before making such change.

SKRoy 26/9/99

Principal Investigator

Trainee

Abstract Summary

Cholera is one of the leading causes of morbidity and mortality among children and adult in developing countries.

We will evaluate the effect of supplementation of zinc on reduction of duration and severity of cholera. Since cholera is primarily a disease of older children and adults, we intend to study the effects of zinc supplementation among children of 3 to 14 years of age, whose initial stool weight will be >4ml/kg/hour in 1st 6 hours and dark field examination is positive. 90 subjects in each group hospitalized with cholera with diarrhea for less than 24 hours will be selected. After inclusion in the study, informed consent will be obtained from guardian explaining the full procedure in the hospital. The subjects will be randomized to receive either zinc or placebo until diarrhea resolves. History of illness and baseline information will be collected in the hospital through interview, which may take duration of 10 minutes.

After 6 hours of initial rehydration, metabolic balance study will be carried out on all subjects until diarrhea resolves. 1 ml (1/4 teaspoonful) of blood sample will be taken to assess serum zinc level on admission after initial hydration and will be repeated on the day of recovery. This procedure carries a small risk of infection if not done under sanitary conditions; however, we will maintain proper sanitation, so there is no risk in the procedures. There is no potential risk in this study.

20mg elemental Zinc will be given daily in 2 divided doses till cholera resolves. Both groups will receive syrup or tablet Erythromycin 50mg/kg/24 in 4 divided doses for 3 days. Oral rehydration solution/intravenous acetate fluid will be used for rehydration. Daily body weight will be taken and stool will be sent for C/S until the day of recovery or 5 days. Zinc loss in stool will be seen in 20% of random stool samples.

Information obtained from history and the laboratory investigations of subject will be kept strictly confidential and no one other than the investigators of this study and the Ethics Committee of this Centre will/ has access to the information.

The study will benefit the patients as study physician will do close observation, examination and will take care frequently, as research staff will monitor systematic progress and take necessary action. Study micronutrient (zinc) is shown to have benefit in children in acute diarrhea. If the results of the study is positive, it will benefit the patients in their treatment during this study and thereafter. The data will be analyzed for clinical effects of zinc on diarrhea.

The study will help to improve the treatment strategy of cholera in children. The study will use hospital records, which will be returned after completion of the study. Stool, urine and 1 ml (1/4 teaspoonful) of venous blood will be taken to assess serum zinc level.

International Centre for Diarrhoeal Disease Research, Bangladesh

RESEARCH PROTOCOL

FOR OFFICE USE ONLY

Protocol No: **Date:**

RRC Approval: Yes/ No Date:

ERC Approval: Yes/No Date:

1. Title of Project (Do not exceed 60 characters including spaces and punctuations)
Clinical Trial of Zinc Supplementation in Cholera Patients

2a. Name of the Principal Investigator(s) (Last, Middle, First).	**2b. Position / Title**	**2c. Qualifications**
1. Dr. S.K.Roy	Scientist	MBBS,MSc PhD(Nutr)

3. Name of the Division/ Branch / Programme of ICDDR,B under which the study will be carried out.
Clinical Sciences

Contact Address of the Principal Investigators	
4a. Office Location: Clinical Science Division , ICDDR, B	**4b. Fax No:** 883 116 **4c. E-mail:** skroy@icddrb.org **4d. Phone No.** 871751-60

Use of Human Subjects	**5a. Use of Live Animal**	**5b. If Yes, Specify Animal Species**
Yes [x]	Yes [ ]	
No [ ]	No [x]	

6. **Dates of Proposed Period of Support** *(Day, Month, Year - DD/MM/YY)*

7. Cost Required for the Budget Period
7a. Ist Year ($): 84,368 *2nd Year ($):* *3rd Year:*

7b. **Direct Cost ($)** 67,494 **Total Cost ($)** 84,368

8. Approval of the Project by the Division Director of the Applicant

The above-mentioned project has been discussed and reviewed at the Division level as well by the external reviewers. The protocol has been revised according to the reviewer's comments and is approved

Mohammed Abdus Salam — **Name of the Division Director**

Signature

06/9/99. — **Date of Approval**

9. **Certification by the Principal Investigator**
I certify that the statements herein are true, complete and accurate to the best of my knowledge. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administra tive penalties. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if a grant is awarded as a result of this application

10. Signature of PI

Date: 6/8/99

Table of Contents

	Page Numbers
Face Page	1
Project Summary	3
Description of the Research Project	4
Hypothesis to be tested	4
Specific Aims	4
Background of the Project Including Preliminary Observations	5
Research Design and Methods	8
Facilities Available	13
Data Analysis	13
Ethical Assurance for Protection of Human Rights	14
Use of Animals	14
Literature Cited	15
Dissemination and Use of Finding	17
Collaborative Arrangements	17
Biography of the Investigators	
Detailed Budget…	18 & 19
Budget Justifications	20
Other Support	
Appendix	
1 Consent Forms in English.	21& 22
2. Consent Forms in Bangla	

[X] Check here if appendix

PROJECT SUMMARY: Describe in concise terms, the hypothesis, objectives, and the relevant background of the project. Describe concisely the experimental design and research methods for achieving the objectives. This description will serve as a succinct and precise and accurate description of the proposed research is required. This summary must be understandable and interpretable when removed from the main application. (**TYPE TEXT WITHIN THE SPACE PROVIDED).**

Principal Investigators Dr. S .K. Roy

Project Name: Clinical Trial of Zinc in Cholera Patients

Total Budget: $ 84,368 **Beginning Date**: As soon as possible **Ending Date**: 12 months from the beginning

Cholera is one of the leading causes of morbidity and mortality among children and adult in developing countries. Recent evidences suggest that use of zinc in children can reduce severity and duration of diarrhea. It is possible to suggest that supplementation of zinc can reduce severity and duration of cholera. But there is no information on clinical effect of zinc in cholera.

We will evaluate the effect of supplementation of zinc on reducing duration and severity of cholera. Since cholera is primarily a disease of older children and adults, we intend to study the effects of zinc supplementation among children of 3 to 14 years of age, whose initial stool weight will be >4ml/kg/hour in 1st 6 hours and dark field examination positive. 90 subjects in each group hospitalized with cholera with diarrhea for less than 24 hours will be randomized to receive either zinc or placebo till diarrhea resolves. Zinc will be given 20 mg (elemental) daily in 2 divided doses. 1 ml of blood sample will be taken to assess serum zinc level on admission after initial hydration and will be repeated on the day of recovery (i.e. the time of passage of last unformed stool or first formed stool followed by 24 hours without any diarrheal stool). Both groups will receive syrup or tab Erythromycin 50mg/kg/24 in 4 divided dose and oral rehydration solution/intravenous acetate fluid. Daily body weight will be taken and fluid balance study will be done on all subjects till recovery Stool will be sent for C/S daily till cholera resolves or 5 days. Zinc loss will be seen in randomly 20% of stool sample.

During this study, we will evaluate the role of zinc in clinical course, stool output, severity and duration of cholera. The data will be analyzed for clinical effect of zinc.

KEY PERSONNEL (List names of all investigators including PI and their respective specialties)

Name	Professional Discipline/ Specialty	Role in the Project
1. Dr. S.K.Roy	Scientist, ICDDR,B	Principal-Investigator
2. Dr. Nafisa M. Saifuddin	Medical Officer, ICDDR,B	Co-Investigator
3. Prof. Andrew Tomkins	Director, CICH, U.K.	Co-Investigator

DESCRIPTION OF THE RESEARCH PROJECT

Hypothesis to be tested:

Concisely list in order, in the space provided the hypothesis to be tested and the Specific Aims of the proposed study. Provide the scientific basis of the hypothesis, critically examining the observations leading to the formulation of the hypothesis.

Supplementation with zinc among children with cholera

a) will reduce the duration of cholera at least by 20%,

b) reduce stool output, in cholera at least by 20%

Specific Aims:

Describe the specific aims of the proposed study. State the specific parameters, biological functions/ rates/ processes that will be assessed by specific methods (**TYPE WITHIN LIMITS**).

General objective:

To evaluate the clinical effect of zinc supplementation during cholera in children.

Specific objectives:

a) To evaluate the impact of zinc supplementation in patients with cholera on stool weight, stool frequency, consistency and duration of cholera.

Background of the Project including Preliminary Observations

Describe the relevant background of the proposed study. Discuss the previous related works on the subject by citing specific references. Describe logically how the present hypothesis is supported by the relevant background observations including any preliminary results that may be available. Critically analyze available knowledge in the field of the proposed study and discuss the questions and gaps in the knowledge that need to be fulfilled to achieve the proposed goals. Provide scientific validity of the hypothesis on the basis of background information. If there is no sufficient information on the subject, indicate the need to develop new knowledge. Also include the **significance and rationale** of the proposed work by specifically discussing how these accomplishments will bring benefit to human health in relation to biomedical, social, and environmental perspectives. **(DO NOT EXCEED 5 PAGES, USE CONTINUATION SHEETS).**

Diarrhea is the leading cause of morbidity and mortality in developing countries[1]. Each year approximately 1 billion episodes of diarrhea are estimated to occur in children under 5 years of age in developing countries[1]. These episodes result in 3 to 4 million deaths each year[1].
During a diarrheal episode, the demand for micronutrients including zinc and vitamin A are increased. Recent evidence suggests that administration of zinc during a diarrhoeal episode reduce the severity of diarrhea in children. A randomized double blind clinical trial in Bangladesh on hospitalized children aged 3 to 24 months were assigned to receive zinc (20 mg elemental zinc / day) for 2 weeks showed there is 28% reduction in stool output and 14% reduction in duration of diarrhea with zinc supplementation than in the control group[2] in malnourished children. But it is not known that whether there is specific reduction of stool output in cholera patients by zinc.

Zinc and intestine:
Zinc is an essential trace element integrally involved in a wide range of metabolic process required for tissue growth and repair as well as necessary for maintaining host defense. Zinc deficiency can occur from lack of adequate dietary intake, decreased intestinal absorption and increased losses in the gastrointestinal tract, urine and sweat. Clinical signs of zinc deficiency can present in a florid manner with dermatitis, alopecia and diarrhea. Zinc is essential for DNA, RNA and protein synthesis and as such important for cell division. Zinc is an inducer of mRNA of metallothionein, a protein that has an important role in intestinal zinc absorption. The earlier recovery and reduced stool weight may be due to better repair of mucosal integrity [3] or intraluminal reduction of pathogens[4] or improved electrolyte transport with zinc supplementation [5,6]. In our previous study, it was noticed that improvement in mucosal integrity was significant in children with acute and persistent diarrhea with zinc supplementation[3] .Intestinal permeability was measured with urinary excretion of lactulose and mannitol after an oral dose. Permeability tests using large and small molecular sugars have been validated as a useful test of mucosal integrity. It is not known whether mucosal damage is an important determinant of micronutrient absorption or endogenous secretion during diarrhea.

In an animal model study, ultrastructural abnormalities in the enterocytes of zinc deficient animals

included degenerative changes in mitochondria; destroyed desmosome system; loss of tight junctions between mucosal epithelial cells; appearance of abnormal lateral space; reduced number of ribosomes and reduced rough endoplasmic reticulum [5].These changes in small intestine were completely absent in *ad libitum* fed control animals with the same diet including adequate zinc (55 mg zinc/kg diet). The aforementioned changes were associated with drastically reduced absorption of water and sodium by the small intestine, which was tested with single pass perfusion of glucose electrolyte solution containing ^{14}C-Polyethylenegycol (PEG4000) as marker. Reversal of absorption defects was associated with concomitant repair of mucosal lesions by 48 hours of repletion of dietary zinc, which also reversed the net transport of sodium and water to normal levels [7]. The same authors showed that *V. cholerae* enterotoxin induced secretion of water, sodium and potassium per unit length of mucosa was significantly higher in zinc-deficient animals compared to that of *ad libitum* zinc containing diet fed controls and the *V. cholera* enterotoxin induced secretion reduced significantly (40% reduction) after dietary zinc supplementation for 48 hours [5]. The correlation between unit mucosal mass and water transport did not fully explain that absorption was only a function of mucosal mass, i.e. the cellular integrity and enzyme co-transport system could have been well related to the net transport of water and electrolytes.

Zinc loss in diarrhea

Severe zinc deficiency in man is a well recognized disease state characterized with diarrhea, mucosal lesion, and bullous skin lesions, alopecia severe infection known as acrodermatitis enteropathica (AE) [8]. Higher concentration of zinc loss has been reported through stool during Crohn's disease [9] and severe protracted diarrhea [10]. Chilean children were found by conventional technique to have a high zinc loss in acute diarrhea such as 159 μg/kg/day [11]. The patients remained in a negative zinc balance of 180 μg/kg/day during the acute phase. The magnitude of fecal zinc loss was comparable with those children in Guatemala [12]. In chronic diarrhea patients, stool zinc loss was recorded to be 300 μg/kg/day where 200 to 300 μg zinc/kg/day was required intravenously to maintain a normal serum alkaline phosphatase level and to resolve skin rash due to zinc deficiency [10].

Effect of zinc loss in diarrhea on growth

In Bangladesh, diarrhoeal morbidity is a significant burden to majority of the malnourished young children. The malnourished children have been identified as zinc deficient in Bangladesh [13] and other developing countries like Jamaica [14]. A recent study in Bangladesh showed that zinc deficiency limits linear growth after diarrhea [15] suggesting a hypothesis that diarrhea causes a zinc deprivation state leading to a diarrhea-malnutrition cycle. Until now there is no accurate information on the absorption or secretion of zinc and other trace elements in children with acute and persistent diarrhea using reliable methods such as stable isotopes. Zinc absorption is possibly further reduced in the malnourished children with various grades of mucosal integrity during and after diarrhoeal attacks.

The small intestine has central role in maintaining zinc homeostasis. Very substantial amounts of endogenous zinc that are secreted into small intestine are needed to be reabsorbed to avoid negative zinc balance. During diarrhea, there is reduced absorption from food and endogenous

secretion as well as reduced dietary intake contributing to the probability of a zinc deprived state. It is therefore, important to consider that not only diarrhoeal state but also the types of diarrhea are important for zinc deprivation in the children. Invasive diarrhea is known to affect the large bowel as well as part of the distal ileum. Many invasive diarrheas cause protein loosing enteropathy while the endogenous secretion in this occasion contains plasma proteins and micronutrients. Zinc loss in invasive diarrhea might appear to be more severe. It has been reported that dysenteric type of illness is frequently associated with growth retardation. Apart from loss of carrier proteins for zinc such as albumin ceruloplasmin and alpha-1-antitrypsin, significant among of zinc loss could be responsible for the stunting of this children following invasive diarrhea.

Effect of zinc in acute diarrhea:

In Bangladesh, a double blind randomized trial of zinc or placebo in multivitamin syrup was conducted among 4-24 months old children suffering from acute diarrhoea for less than 3 days. 5 mg of elemental zinc per kg body weight per day was administered for two weeks. When the results were compared, benefits of zinc supplementation were observed among the children who were hypozincemic ($<14\mu mol/l$) and shorter ($<95\%$ HT/Age)[16].The mean duration for recovery from acute diarrhea was shorter (4.7 Vs 6.0 days, $p<0.04$) among the hypozincemic children (serum zinc <14 μmol/l). Similar trend was seen in children who were wasted (4.9 Vs 5.8 days $p=0.3$) and stunted (5.0 vs 6.0 days $p=0.1$). In these patients, significant reduction in median stool weight during recovery was noticed among the hypozincemic children (279 vs 329g, $p<0.04$) and shorter children (238 vs 325 g, $p<0.05$) who were zinc supplemented compared to placebo. Patients with acute diarrhea showed significant rise in serum zinc levels compared to controls when zinc supplementation was given. Body weight of acute diarrhea patients increased significantly with zinc supplementation. The effect of zinc was reflected in serum level and body weights.

Recent studies have suggested that zinc supplementation for diarrhea reduces stool output and duration of diarrhea[17]. It has also been reported that when zinc supplementation is given to children during diarrhea, improved catch-up growth was seen during next few months compared to a non-supplemented group[15]. In ICDDR, B, about 157,000 patients attend the hospital for diarrhea, among which 24% present with cholera of which, 34% children are between 3-14 years of age.

Therefore, in this study we will evaluate the effect of zinc supplementation on the severity and duration of diarrhea due to cholera in children. We hypothesized that supplementation of zinc will have an effect on the severity of illness.

Rationale of the study

The proposed study will be a double blind placebo controlled two-cell trial to evaluate the effect of zinc supplementation compared to control group for reduction of diarrhea due to cholera. Most of the children in Bangladesh are likely to have inadequate zinc nutrition due to low dietary intake. In Bangladesh cholera as well as childhood malnutrition associated with zinc deficiency are prevalent. Zinc supplementation has been shown to reduce both stool output and duration of diarrhea in acute watery diarrhea. However, no information is available about the effect of zinc

in the treatment of cholera. If the severity of cholera is reduced by supplementation with zinc, it will have major implications for the use of zinc as an adjunct therapy in the treatment of cholera.

Research Design and Methods

Describe in detail the methods and procedures that will be used to accomplish the objectives and specific aims of the project. Discuss the alternative methods that are available and justify the use of the method proposed in the study. Justify the scientific validity of the methodological approach (biomedical, social, or environmental) as an investigation tool to achieve the specific aims.
Discuss the limitations and difficulties of the proposed procedures and sufficiently justify the use of them. Discuss the ethical issues related to biomedical and social research for employing special procedures, such as invasive procedures in sick children, use of isotopes or any other hazardous materials, or social questionnaires relating to individual privacy. Point out safety procedures to be observed for protection of individuals during any situations or materials that may be injurious to human health. The methodology section should be sufficiently descriptive to allow the reviewers to make valid and unambiguous assessment of the project. **(DO NOT EXCEED TEN PAGES, USE CONTINUATION SHEETS).**

Study design:

A double blind randomized clinical trial using zinc and placebo.

Inclusion criteria:

a) Children aged between 3-14 years hospitalized at ICDDR, B presenting with cholera within 24 hours of onset.
b) Stool output more than 4ml/kg/hour within the first 6 hours of observation period.
c) Positive dark field examination
d) Patients with some and severe dehydration
e) No other systemic infections requiring antibiotics or intensive care.

Exclusion criteria:

Patients presenting with the following conditions will be excluded:
a) Unable to rehydrate within 6 hours
b) Negative dark field examination
c) Systemic illness requiring immediate administration of antibiotics.
d) Received antibiotics in the 24 hours prior to hospitalization

e) Patients presenting with bloody mucoid diarrhea
f) Unconscious or medical emergencies

Ethical consent:

Informed written consent will be obtained from the parents/guardian after explaining the details of study procedure before selecting for the study.

Randomization:

Patients will be randomized to one of two groups, A or B. Block randomization will be done using block length of 6. Group A will receive Zinc+ Erythromycin and
Group B: will receive Placebo+Erythromycin

Dose of Erythromycin

Syrup/tab Erythromycin 50mg/kg/24 hours in 4 divided doses for 3 days.

Dose of zinc:

Zinc acetate will be given at 10mg twice daily (10mgx2=20mg elemental zinc) until cholera resolves (the time of passage of last unformed stool or first formed stool followed by 24 hours without any diarrheal stool).

Composition of the syrup:
For both groups, the bulk of the base syrup will be consist of the same chemicals; in addition to this, group A will have the treatment substance (i.e. elemental zinc 20 mg/day)

Syrup A:	**Quantity per 5 ml**
Zinc Acetate	10 mg elemental zinc
Syrup B:	Base substance
Base Substance:	
Ascorbic acid	30 mg
Glycerin USP	1.2 ml
Propylene glycol USP	0.75 ml
Sorbitol 70% BP	2.0 ml
Methyl Paraben USFN	3.5 mg
Polysorate-80 (Tween -80) BPC	50 mg
Lemon oil P^H grade	0.0125 ml
Caramel Brown colour	1 mg
Purified water	0.75 ml

Clinical procedure in the hospital:

Patients who meet the selection criteria will be observed for initial six hours, while their urine and stool specimen will be collected separately. Patient whose initial stool-output >4ml/kg/hour during this period and dark field examination of stool is positive will be enrolled in the study. Patients will be kept in study ward. After complete hydration, patients will be randomised in blocks of 6 to one of two groups A and B. Group A will receive syrup zinc and group B will receive placebo till cholera resolves. Both the groups will receive the identical bottles containing syrup with same flavor and only single unique serial number will be written on the bottles. The number will indicate an exact subject of study. Both the groups will receive Syrup/Tab Erythromycin. 1ml blood will be collected for serum zinc on admission after complete dehydration and this test will be repeated at the time of discharge. Stool culture and sensitivity (C/S) will be sent daily until the day of recovery or 5 days. Balance will be performed on all the patients till cholera resolves. If any complication develops after enrollment, study will be discontinued and patient will be treated accordingly.

Assessment of dehydration:

To reduce observational variation, especially regarding the assessment of dehydration, a standardized form is developed for the assessment of dehydration.

CONDITION*	(1=normal, 2=irritable/lessactive, 3=lethargic/comatose)
MUCOSA	(1=normal, 2=dry)
EYES	(1=normal, 2=sunken)
THIRST*	(1=normal, 2=thirsty, 3=unable to drink)
SKIN TURGOR*	(1=normal, 2=reduced)
PULSE*	(1=normal, 3=feeble/absent)

DEHYDRATION STATUS:

1= no sign of dehydration
2= some dehydration (two signs coded 2 with at least one key sign*)
3= severe dehydration (some dehydration, plus one key sign* coded 3)

(* This method was recently validated by a group of international experts in oral rehydration therapy who were invited to ICDDR, B and is currently being used in a large WHO sponsored multi-centre trial for the evaluation of low osmolarity ORS. The investigators have been trained in this method).

Rehydration phase:

All the patients recruited in this study, will have either, some dehydration or severe dehydration. Therefore, before being randomized into study, during initial 6 hours all the patients will be rehydrated either by ORS or intravenous fluid. Patients with signs of some dehydration will be rehydrated by ORS and patients with severe dehydration will be rehydrated intravenously as described below. The following IV fluids will be used:

	Sodium	Potassium	Chloride	Acetate
Dhaka Solution	(mmol/L)	(mmol/L)	(mmol/L)	(mmol/L)
	133	13	98	48

Rate of administration will be 100 ml/kg over 4 hours, plus volume-for-volume replacement for ongoing losses hourly.

If, at the end of four hours:

1. The patient is fully rehydrated, he/she will be randomized to one of the treatment groups;
2. Some dehydration persist, IV infusion will continue at the rate of 50 ml /kg over 2 hours, plus replacement volume for volume of ongoing losses;
3. Severe dehydration persists, IV infusion will continue for an additional 2 hours at the rate of 100 ml/kg, plus replacement of ongoing losses. This is very unusual, however, occurring only in very few patients who pass large watery stools frequently.

If at the end of six hours, the patient is fully rehydrated patient will be randomized to one of the treatment group. If signs of dehydration persist after 6 hours, the patient will be excluded from study.
All intake and output during this initial rehydration phase will be recorded.

Maintenance phase:
After completion of rehydration, subjects will be randomized to one of the two groups
Group A and Group B. Group A will be given zinc acetate and group B will be given placebo. The supplementation of zinc or placebo will be continued till diarrhea resolves. Ongoing stool losses will be replaced with equal volume of Rice-ORS.

Dietary management:

Standardize hospital diet will be given to all patients which includes milk suji, rice, vegetable, daal, bread banana and chicken or fish.

Intake and output measurement:

All oral and intravenous fluid will be measured and recorded until cholera resolves. Stool weight will be measured separately from urine every 8 hours until cholera resolves. Urine will be separated and measured 8 hourly, weight of vomitus will also be taken 8 hourly. Daily clinical examination will be done by the investigators and study physician with observation on stool consistency and character.

Clinical recovery:

Clinical recovery will be defined as the time of passage of last unformed stool or first formed stool followed by 24 hours without any diarrheal stool.

Sample size calculation:

We assume that zinc will reduce 20% of mean duration of illness compared to erythromycin group[18] at 90% power and 5% level of confidence. Therefore the sample size will be:
$n=2\ (SD)^2\ \alpha\beta/(D)^2$
$n=2\ (5)^2\ 10.5/(2.6)^2$
$n=77.66=78$ per treatment group
So the total number of samples will be 78 x 2 =156. Considering 15% drop out the total number of samples will be 156+24=180

Assessment of weight gain:

Weight will be taken on admission and daily until cholera resolves.

Laboratory tests:

a) Microscopic examination

1. Dark field examination will be done on stool samples on admission.
b) Microbiological assays:
1 Daily stool C/S will be done till cholera resolves or 5 days.
c) Micronutrient assay:
1. Serum zinc level will be obtained on day 1 and on the day of recovery
2. Randomly zinc loss in cholera will be seen in 20% samples.

Facilities Available

Describe the availability of physical facilities at the place where the study will be carried out. For clinical and laboratory-based studies, indicate the provision of hospital and other types of patient's care facilities and adequate laboratory support. Point out the laboratory facilities and major equipment that will be required for the study. For field studies, describe the field area including its size, population, and means of communications. **(TYPE WITHIN THE PROVIDED SPACE).**

The hospital is an approximately 250 bed facility, also known as the Clinical Research and Service Centre (CRSC) with an annual patient population of about 114,000. Study Subject will be housed in the study ward. The existing hospital and laboratory facilities will be used. The laboratory processes approximately 18,000 serum samples per year. It possesses an atomic spectrophotometer, which will be used to analyze serum zinc.

Data Analysis

Describe plans for data analysis. Indicate whether data will be analyzed by the investigators themselves or by other professionals. Specify what statistical software packages will be used and if the study is blinded, when the code will be opened. For clinical trials, indicate if interim data analysis will be required to monitor further progress of the study. **(TYPE WITHIN THE PROVIDED SPACE).**

Key variables: to be collected.

1) Comparison of baseline characteristics between two groups using appropriate statistical tests (t-test)

2) Duration of cholera in days (8 hrs x no/3): Comparison of mean duration of cholera in two groups by student's t-test.

3) Daily and cumulative stool weight. Comparison of stool weight in two groups will be done by T-test or non-parametric test if distribution is non-normal.

4) Comparison of duration of recovery using survival analysis.

5) Stool weight by days till cholera resolves.

6) Stool frequency (daily + cumulative). Comparison of stool frequency in two groups will be done by student's t-test or non-parametric as indicated.

7) Weight gain after hydration by days using t-tests.

8) Comparison of intravenous fluid requirement in two groups.

Data analysis plan:
After completion of the study, coded data will be entered into SPSS software. Consistency, validity and accuracy of data entry will be checked and data will be cleaned using the validate program, Analysis will be done using the windows SPSS, EPI-6 and NCHS statistical package. For normally distributed data students t-test will be used to compare between two groups and for non-normal distribution, non-parametric test will be done. Life table/survival analysis will be done to see the difference in duration of diarrhea due to cholera between groups.

Ethical Assurance for Protection of Human Rights

Describe in the space provided the justifications for conducting this research in human subjects. If the study needs observations on sick individuals, provide sufficient reasons for
using them. Indicate how subject's rights are protected and if there is any benefit or risk to each subject of the study.

Cholera is a disease that causes high morbidity and mortality in Bangladesh Therefore, any intervention that can reduce the severity of illness will be of great benefit to the population. Informed consent will be obtained at the time of enrolment from the parents/guardian of the subjects. The investigators will explain the purpose of the study, the rationale, the procedures to be performed and the risks and the benefits to the guardian of the subjects. The physician will ensure that they understand procedures and agree to participate in the research project, and that they may withdraw their child from study at any time.

Use of Animals

Describe in the space provided the type and species of animal that will be used in the study. Justify with reasons the use of particular animal species in the experiment and the compliance of the animal ethical guidelines for conducting the proposed procedures.

No animals will be used in this study

Literature Cited

Identify all cited references to published literature in the text by number in parentheses. List all cited references sequentially as they appear in the text. For unpublished references, provide complete information in the text and do not include them in the list of Literature Cited. There is no page limit for this section, however exercise judgment in assessingthe"standard"length.

1. Snyder, J., et. al. The magnitude of the global problem of acute diarrheal disease: a review of active surveillance data. Bull WHO, 1982, 60:605-13.

2. Roy SK, Tomkins AM, Akramuzzaman SM, Behrens RH, Haider R, Mahalanabis D, Fuchs G. Randomized controlled trial of zinc supplementation in malnourished Bangladeshi children with acute diarrhoea. Archives of disease in childhood, 1997;77:3:196-200.

3. S. K. Roy et al. Impact of Zinc Supplementation on Intestinal Permeability in Bangladesh Children with Acute Diarrhoea and Persistent Diarrhoea Syndrome. J Pediatr Gastroenterol Nutr, Vol. 15, No. 3, 1992

4. Fenwick PK, Agget PJ, Macdonald D, Huber C, Wakelin D. Zinc deficiency and zinc repletion: effect on the response of rats to infection with Trichinella spiralis. Am J Clin Nutr 1990;52:166-72.

5 Roy SK, Drasar BS and Tomkins AM. The impact of zinc deficiency on intestinal response to cholera toxin (abstract). Proc Nutr Soc 1986;45:39A.

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7. Roy SK, Tomkins AM. Effects of acute repletion of experimental zinc deficiency on intestinal absorption (abstract). In abstract of original communications, 13th International Congress of Nutrition, Brighton ,18-23 Aug 1985:139.

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9. Beeken WL, Busch HJ, Sylwester DL. Intestinal protein loss in Crohn's disease. Gastroenterology 1972;62:207-15.

10. Rothbaum RJ, Maur PR, and Farell MK. Serum alkaline phosphatase and zinc undernutrition in infants with chronic diarrhea. Am J Clin Nutr 1982;35:595- 98.

11. Castillo-Duran C, Vial P, Uauy R. Trace mineral balance during acute diarrhoea in infants. J Pediatr 1988;113:452-7.

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13. Khanum S, Alam AN, Anowar I, Ali-A M and Rahaman MM. Effect of zinc supplementation on the dietary intake and weight gain of Bangladeshi children recovering from protein energy malnutrition. Eur J Clin Nutr 1988;42:709-14.

14. Golden BE, Golden MHN. Plasma zinc and the clinical features of malnutrition. Am J Clin Nutr 1979;32:2490-4.

15. Behrens RH, Tomkins AM and Roy SK. Zinc supplementation during diarrhoea a fortification against malnutrition. Lancet 1990;11:442-3 (letter).

16. Roy SK, Tomkins AM, Akramuzzaman SM. Current management of persistent diarrhoea and malnutrition in developing countries. Hong Kong J Paediatr. 1995;1(suppl):100-113

17. Sachdev HPS. A controlled trial on utility of oral Zinc supplementation in acute dehydrating diarrhoea in infants. J Pedtir Gastr Nutr 1988; 7: 877-81.

18. Wasif Ali Khan, Monira Begum, Mohammad Abdus Salam, Pradip Kumar Bardhan, Mohammad Rafiqul Islam and Dilip Mahalanabis. Comparative trial of five antimicrobial compounds in the treatment of cholera in adults. Transactions.

Dissemination and Use of Findings

Describe explicitly the plans for disseminating the accomplished results. Describe what type of publication is anticipated: working papers, internal (institutional) publication, international publications, international conferences and agencies, workshops etc. Mention if the project is linked to the Government of Bangladesh through a training programme.

Two things will be done with the result of this study

1. The result will be disseminate in national and international seminars and will published in peer-reviewed journal for sharing consumption within the scientific community
2. Result will be used to improve existing cholera management protocols and programmes, both at ICDDR, B and internationally.

Collaborative Arrangements

Describe briefly if this study involves any scientific, administrative, fiscal, or programmatic arrangements with other national or international organizations or individuals. Indicate the nature and extent of collaboration and include a letter of agreement between the applicant or his/her organization and the collaborating organization. **(DO NOT EXCEED ONE PAGE)**

1. Professor Andrew Tomkins (The Centre for International Child, Institute of Child Health, London): He is a continuous collaborative partner with us in zinc research. He has contributed in original work of zinc and diarrhea and participated in design of the study. He will also assist in write up of manuscript. He will help through his expertise and advice as needed.

Detailed Budget for New Proposal

Project Title: Clinical Trial of Zinc in Cholera Patients
Name of PI: Dr. S. K. Roy

Protocol Number: 99-022 **Name of Division:** Clinical Sciences

Funding Source: **Amount Funded (direct):** $ 67,494 **Total:** $ 84,368
Overhead:(25%)$ 16,874

Starting Date: As soon as approved Closing Date: 12 months after start

1) Personnel Cost

Name	Project position	Rate/month ($)	12 months
Dr. S.K. Roy (25%)	Principal Investigator	433	5,196
Dr. Nafisa M. Saifuddin (100%)	Co-Investigator	489	5,868
Research Officer(100%)		349	4,188
Research Assistant (2) (100%)	267x2	534	6,408
Health Worker (4) (100%)	4x78	312	3,744
Secretary (10%)		76	912
Sub-total			**26,316**

2) Travel

Local	500
International	2,000
Sub-total	**2,500**

3) Supplies & Materials

Office Supplies	700
Medical Supplies	800
Others	500
Sub-total	**2,000**

4) Other Expenses

Postage, Fax, Rental, Electricity,		
Repair & Maintenance		500
Printing & Publications		1,000
Sub-total		**1,500**
5) Hospitalization Cost	**180x25x5days**	**22,500**

6) Laboratory Cost

a) Stool C/S	180x12x5	10,800
b) Stool zinc (20%)	36x8	288
b) Biochemical Estimation of zinc	180x2x4	1,440
c) Zinc syrup		150
Sub-total		**12,678**

Total direct cost	**67,494**
Indirect cost (25%)	**16,874**
Total project cost	**84,368**

4.8.98

M. Rahman Chowdhury
Senior Budget & Cost Officer
ICDDR, B, Mohakhali
Dhaka-1212, Bangladesh.

Budget Justifications

Please provide one page statement justifying the budgeted amount for each major item. Justify use of man power, major equipment and laboratory services

Research Officer: One research officer will be needed to take part in supervisory procedure and organize all the necessary steps for procedure of research. Take part directly in study procedure. Also supervise quality of bedside research activities, training of subordinate staff members. Will help communicating to offices, data analysis and coordinate results from clinical data and **laboratory reports.**

Research Assistant: 2 in number will be needed to perform the following duties:
Selection of the patients according to the study criteria, collection, preservation, processing of the samples and sending for lab analysis with recording, record keeping of lab results and check results. Administration of the study syrup to the subject as per guidelines and perform metabolic balance study.

Health Worker: To search initially for study patient from treatment centre and strictly remain at bedside for 24 hours by 8 hourly shifting duty including night duty. During night duties, data quality control is important with 24 hours output till diarrhea resolves, 4 of such persons are necessary to do a 8 hourly shifting duties. They perform record keeping of stool, urine output and dietary intake as well stool and breastfeeding frequency.

APPENDIX 1

International Centre for Diarrheal Disease Research, Bangladesh
Consent Form

Title of the Research Project: Clinical Trial of Zinc in Cholera Patients

Principal Investigator: SWAPAN KUMAR ROY

Before recruiting into the study, the study subject must be informed about the objectives, procedures, and potential benefits and risks involved in the study. Details of all procedures must be provided including their risks, utility, duration, frequencies, and severity. All questions of the subject must be answered to his/ her satisfaction, indicating that the participation is purely voluntary. For children, consents must be obtained from their parents or legal guardians. The subject must indicate his/ her acceptance of participation by signing or thumb printing on this form.

Your child is suffering from cholera, which is caused by infection due to a germ called *V. Cholerae*. It has been shown that acute watery diarrhea due to *Cholera* causes severe illness children become more susceptible to risk of death. It is thought that improvement in children's nutritional status by nutritional supplements during cholera helps in promoting rapid recovery from the acute illness, better growth and health following recovery as well as improving immunity. Zinc reduces acute diarrhea in children One such nutritional supplement is zinc, a micronutrient, which has been shown to reduce water and electrolyte secretion in animal models and help in growth of children following watery diarrhea. In this study, we will study the effect of zinc, which will be given till recovery along with the conventional antibiotic therapy, i.e. Erythromycin. For this purpose, children with cholera will be given either zinc or placebo and the responses in the two groups of children will be compared. We would like to enroll your child in this study and if you agree to our proposal, you will have to follow the following procedure.

1. Your child will be admitted in the study ward of this hospital until his/her condition permits discharge from the hospital, and during hospitalization she/he will receive the standard treatment of this hospital.

2. On the day of admission, we will ask you questions related to the illness of your child including history and physical examination, and record all information. We will ask about medical problems and perform physical examination on your child on each day when she/he remains in this hospital.

3. Along with the routine treatment for cholera, your child will receive syrup containing either zinc or placebo twice daily untill recovery (i.e. the time of passage of last unformed stool or first formed stool followed by 24 hours without any diarrheal stool). The syrup will provide additional nutrition to your child.

4. This dose of zinc has been used many times before without any harmful effects. We believe it is safe. We will also need to take one ml (1/4 teaspoonful) of blood sample at the beginning

and at the end of the study to check the serum zinc level. This procedure carries a small risk of infection if not done under sanitary conditions; however, we will maintain proper sanitation.

5. It is expected, if our study shows positive effect, stool volume of your child will be reduced and may recover more quickly from cholera.

6. On admission stool culture and dark field examination of a stool sample will be done to diagnose the disease. Stool culture will be done daily till recovery.

7. You are the one to decide participation of your child in this study. If your child does not participate in this study, or even if you withdraw your consent during the study, she/he will continue to receive the standard care and treatment of this hospital.

8. Information obtained from history and the laboratory investigations of your child will be kept strictly confidential and no one other than the investigators of this study and the Ethical Review Committee of this Centre will have access to the information.

9. If you want to know the results of any or all investigations we will happily provide those to you, subject to their availability.

If you agree to our proposal for participation of your child in this study, please put your signature or left thumb impression at the specified space below:

Thank you for your co-operation.

_____ _____

Signature of the investigator Date:

_____ _____

Signature/LTI of subject/guardian Date:

_____ _____

Signature of the witness Date:

আন্তর্জাতিক উদরাময় গবেষণা কেন্দ্র
মহাখালী, ঢাকা-১২১২
(কলেরায় দস্তার গবেষণা)

সম্মতি পত্র

আপনার শিশু কলেরায় ভূগছে। 'ভিবরিও কলেরা' নামক একটি জীবাণু থেকে এই রোগ হয়। এটা দেখা গেছে যে, কলেরা জীবাণু জনিত ডায়রিয়ার ফলে শিশুরা অনেক বেশী অসুস্থ হয়ে পড়ে এবং মৃত্যুর ঝুঁকি বেড়ে যায়। এটা মনে করা হয় যে কলেরা আক্রান্তকালীন সময়ে পুষ্টি সরবরাহের মাধ্যমে শিশুদের পুষ্টির মান বাড়াতে পারলে তাদের দ্রুত রোগমুক্তিতে সাহায্য করবে। পরবর্তীতে এটা স্বাস্থ্যের উন্নতি, বৃদ্ধি এবং রোগ প্রতিরোধক শক্তি বাড়াতে সহায়তা করবে। দস্তা শিশুদের স্বল্পকালীন ডায়রিয়া কমায়। প্রাণী গবেষণায় দেখা গেছে যে, দস্তা এমন একটি অনুখাদ্য যা শরীর থেকে প্রয়োজনীয় পানি ও খনিজ লবণ নিঃসরণ রোধ করে। দস্তা শিশুদের ডায়রিয়া পরবর্তীকালীন বৃদ্ধিতে সহায়তা করে। এই গবেষণায় আমরা দস্তার প্রভাব পরীক্ষা করবো। রোগমুক্তি না হওয়া পর্যন্ত প্রচলিত কলেরা চিকিৎসা যেমন "ইরিথ্রোমাইসিন" ঔষধের পাশাপাশি আমরা শিশুকে দস্তার সিরাপ খাওয়াবো। এই উদ্দেশ্যে কলেরায় আক্রান্ত শিশুদের দুই দলে ভাগ করে একদলকে দস্তামিশ্রিত এবং অন্যদলকে দস্তাবিহীন সিরাপ দেওয়া হবে এবং দুই দলের মধ্যে প্রতিক্রিয়া তুলনা করা হবে। আমরা এই গবেষণায় আপনার শিশুকে অন্তর্ভূক্ত করতে চাই। যদি আপনি রাজী থাকেন তাহলে আপনাকে নিম্নলিখিত পদক্ষেপগুলি মেনে চলতে হবে।

১। আপনার শিশুকে এই হাসপাতালে ভর্তি করা হবে এবং অবস্থার উন্নতি না হওয়া পর্যন্ত চিকিৎসাধীন থাকবে। চিকিৎসা চলাকালীন সময়ে সে হাসপাতালের সব ধরণের চিকিৎসা সুবিধা পাবে।

২। ভর্তির দিনে আপনাকে শিশুর অসুস্থতা সম্পর্কে কিছু প্রশ্ন করা হবে এবং যতদিন আপনার শিশু হাসপাতালে ভর্তি থাকবে ততদিন শিশুর বর্তমান অসুস্থতা জানার জন্য দিনে একবার করে শিশুর স্বাস্থ্য পরীক্ষা করা হবে।

৩। কলেরা চিকিৎসার সাথে সাথে আপনার শিশুকে দস্তা মিশ্রিত অথবা দস্তাবিহীন সিরাপ দিনে দুইবার আরোগ্য লাভ (বিগত ২৪ ঘন্টার মধ্যে যদি কোন পাতলা পায়খানা না হয়, তখন রোগীর ডায়রিয়া থেকে আরোগ্য লাভ বলা হবে) না হওয়া পর্যন্ত দেয়া হবে। এই সিরাপ শিশুকে বাড়তি পুষ্টি যোগাবে।

৪। দস্তার এই মাত্রা পূর্বে বহুবার ব্যবহৃত হয়েছে। এতে কোন রকম ক্ষতিকারক প্রভাব নেই। আমরা জানি এটা নিরাপদ। এছাড়া আমরা শিশুর রক্তের দস্তার মাত্রা দেখার জন্য শিশুর শরীর থেকে চিকিৎসার শুরুতে একবার এবং শেষে একবার মোট দুইবার ১ মিঃলিঃ (১/৪ চা-চামচ) করে রক্ত নেয়া হবে। যদিও এ পদ্ধতিতে খুবই সামান্য রোগ সংক্রমণের ঝুঁকি থাকে। যা হোক, এ ব্যাপারে সব রকম ঝুঁকি এড়াতে যথোপযুক্ত ব্যবস্থা নেয়া হবে।

৫। এটা আশা করা যায়, যদি আমাদের গবেষণা আশানুরূপ হয় তাহলে আপনার শিশুর পায়খানার পরিমাণ কমে যাবে এবং তাড়াতাড়ি আরোগ্য লাভ করবে।

৬। ভর্তির দিন রোগ নির্ণয়ের জন্য পায়খানার ডার্ক ফিল্ড পরীক্ষা এবং পায়খানার কালচার পরীক্ষা করা হবে। এছাড়া রোগীর আরোগ্য লাভ পর্যন্ত প্রতিদিন পায়খানার কালচার করা হবে।

৭। আপনি ইচ্ছা করলে আপনার শিশুকে এই চিকিৎসায় অন্তর্ভূক্ত করতে পারেন অথবা না করতে পারেন। এমনকি আপনি গবেষণা চলাকালে শিশুকে গবেষণা থেকে প্রত্যাহার করতে পারেন। তথাপি আপনার শিশুর সাধারণ চিকিৎসা চলবে।

৮। আপনার শিশুর সব তথ্য গোপন রাখা হবে। কেবলমাত্র গবেষণাকারী চিকিৎসক এবং কেন্দ্রের "নৈতিক " সমীক্ষা কমিটি এই তথ্য জানতে পারবেন।

৯। যদি আপনি শিশুর কোন রিপোর্ট জানতে চান তবে তা কেবল মাত্র পরীক্ষা সম্পন্ন হবার পর ফল জানা যাবে। কোন কোন পরীক্ষার ফল আপনার শিশুর ছুটি হয়ে যাবার পর আমাদের হাতে এসে পৌছাতে পারে।

আপনি যদি আপনার শিশুকে এই গবেষণায় অন্তর্ভূক্ত করতে রাজী হন, তাহলে নীচের নির্দেশিত স্থানে আপনার স্বাক্ষর অথবা বাম হাতের বুড়ো আঙ্গুলের ছাপ দিন।

আপনার সহযোগিতার জন্য ধন্যবাদ।

_____
প্রধান গবেষণাকারীর স্বাক্ষর তারিখঃ _____

_____
রোগীর অভিভাবকের স্বাক্ষর/
বাম হাতের বুড়ো আঙ্গুলের ছাপ তারিখঃ _____

_____
সাক্ষীর স্বাক্ষর তারিখঃ _____

Study Time Chart

Activities	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Staff recruitment, Training and procurement												
Initiate study												
Patient enrollment												
Lab investigation												
Data entry												
Data cleaning												
Data analysis												
Report writing												

Title: *Clinical Trial of Zinc Supplementation in Cholera patients*

Principal Investigator: *Dr. Swapan Kumar Roy*

Answers to the reviewers comments

Reviewer 1

1) Patient will not entered into the study as long as 48 hours after admission. Patient who will have history of diarrhea for less than 48 hrs, stool out put > 4ml/kg/hour within 1st 6 hours and positive stool dark field examination will be enrolled in to the study. We can not make 24 hour cut off point because we will miss many patient as they do not very frequently visit hospital with in 24hours of onset.

2) Patient who meet the selection criteria will be taken in the study as soon as they are fully rehydrated and patient will be randomized into one of the 2 group. 1ml of blood will be taken on admission and supplementation will be started.

3) Zinc loss will be studied in 20% samples randomly taken from both groups. So the study will remain double blind.

Reviewer 2

No comment is made.

→ Dr. S.C. Roy
Rev I

ATT DR. M.A. SALAM

Title: Clinical trial of zinc supplementation in cholera patients

Summary of Referee's Opinions: Please see the following table to evaluate the various aspects of the proposal by checking the appropriate boxes. Your detailed comments are sought on a separate, attached page.

	Rank Score		
	High	Medium	Low
Quality of project	x		
Adequacy of project design	x		
Suitability of methodology	x		
Feasibility within time period	not specified		
Appropriateness of budget	looks all right, but not qualified to judge		
Potential value of field of knowledge	x		

CONCLUSIONS

I support the application:

a) without qualification / /

b) with qualification

- on technical grounds /x/ (see p.2)
- on level of financial support / /

I do not support the application / /

Name of Referee: Ted Greiner

Signature: Ted Greiner Date: June 1, 1999

Position: Senior Lecturer

Institution: International Maternal and Child Health Section
Uppsala University Medical School

Detailed Comments

Please briefly provide your opinions of this proposal, giving special attention to the originality and feasibility of the project, its potential for providing new knowledge and the justification of financial support sought; include suggestions for modifications (scientific or financial) where you feel they are justified.

(Use additional pages if necessary)

Title: Clinical trial of zinc supplementation in cholera patients

PI: Dr. S.K. Roy

Reviewer: Ted Greiner

This study looks well-planned on almost all fronts and important. I have two questions on aspects that seemed unclear to me and one objection to the study design as described.

First, it is unclear why some patients would be entered into the study as long as 48 hours after admission. It would seem wiser to take them immediately or as soon as possible, and consider having 24 hours as a cut-off point.

Second, there is no clear definition of how and when the decision will be made that the patients are ready to begin the supplementation. If enetered rather immediately upon admission, then presumably it is when the initial rehydration is achieved. But for those who have been admitted for up to 48 hours, presumably that should already have taken place--or do they mean some level of stabilization--but presumably this would often occur too late for the zinc to do much good.

Finally, it is a breach against the study protocol to write that zinc loss will be studied in 20% of samples randomly taken from the placebo group. In that case it is not a double blind study!

Reviewer II

Title: Clinical trial of zinc supplementation in cholera patients

Summary of Referee's Opinions: Please see the following table to evaluate the various aspects of the proposal by checking the appropriate boxes. Your detailed comments are sought on a separate, attached page.

	Rank Score		
	High	Medium	Low
Quality of project	✓		
Adequacy of project design	✓		
Suitability of methodology	✓		
Feasibility within time period	✓		
Appropriateness of budget	✓		
Potential value of field of knowledge	✓		

CONCLUSIONS

I support the application:

a) without qualification / ✓

b) with qualification

- on technical grounds / /
- on level of financial support / /

I do not support the application / /

Name of Referee: B. SDRASAR

Signature: .....

Date: 30-4-99

Position: Professor of Pathology

Institution: LSHTM

Detailed Comments

Please briefly provide your opinions of this proposal, giving special attention to the originality and feasibility of the project, its potential for providing new knowledge and the justification of financial support sought; include suggestions for modifications (scientific or financial) where you feel they are justified.

(Use additional pages if necessary)

Title: Clinical Trial of Zinc supplementation in cholera patients.

PI:

Reviewer:

The role of zinc deficiency in the function of the small intestine has long been a topic of research interest but zinc supplementation has seemed to be to simple an intervention to be attempted. However, the results of preliminary studies have been very promising. Further, the results of Vitamin A supplementation have confounded sceptics and made simple intervention respectable in a High-Tec era. Zinc has similar promise. The investigators are to be congratulated for their courage in taking this forward.

CURRICULUM VITAE

Name	:	SWAPAN KUMAR ROY
Father's name	:	Harendra Nath Roy
Permanent address	:	Village - Bajua, Post Office - Dhopadi, District - Khulna, Bangladesh
Present address	:	International Centre for Diarrhoeal Disease Research, Bangladesh GPO Box 128, Dhaka 1000, Bangladesh Tel: 871751-60, Fax 880 2 883116
Date of birth	:	12 November 1950
Marital status	:	Married

EDUCATIONAL QUALIFICATIONS:

1.	1990:	Ph.D. in Nutrition, University of London. Title of the thesis: Impact of zinc supplementation in children with acute and persistent diarrhoea.
2.	1985:	Certificate on Food, Nutrition, Biotechnology and poverty. The United Nations University, at London School of Hygiene and Tropical Medicine, UK.
3.	1984:	M.Sc. in Human Nutrition. London School of Hygiene and Tropical Medicine, UK.
4.	1973:	MBBS, Dhaka Medical College, University of Dhaka, Dhaka, Bangladesh. Passed regularly, obtained 60% marks.
5.	1968:	H.S.C. (Higher Secondary Certificate Examination). Stood 9th in Jessore Board, Bangladesh.
6.	1966:	S.S.C. (Secondary School Certificate Examination). Stood 11th in Jessore Board, Bangladesh.
7.	1963:	Junior Scholarship (Class VIII). lst grade in Jessore Board, Bangladesh.
8.	1960	Primary Scholarship (Class V). Stood lst in Jessore Range, Bangladesh.

PROFESSIONAL EXPERIENCES

1. Assistant Surgeon, Dhaka Medical College Hospital (full time resident), 1975-76.

2. Physician, ICDDR,B (previous Cholera Research Laboratory), Hospital Patients' Care and community management of cholera epidemics, 1976-81.

3. Senior Medical Officer, ICDDR,B, 1981-87.

4. Associate Scientist, Clinical Sciences Division, ICDDR,B, 1987-92.

5. Present position:

   SCIENTIST, since 1992
   Head, Clinical Unit -I, CRSC, ICDDR,B
   Divisional Co-ordinator, Nutrition Working Group, ICDDR,B

DATE OF JOINING ICDDR,B - March 1976.

RESEARCH EXPERIENCE as participant

1. Determinants of Natural Fertility. PI: Dr. A.K.M. Alauddin Chowdhury and Dr. Sandra Huffman. Research in Matlab community for 3 years (1976-79).

2. Growth Pattern of Children in Rural Bangladesh. PI: Dr. M.U. Khan. In a community clinic for 2 years (1976-78).

3. Study of Trimethoprim and Sulphamethoxazole in shigellosis (clinical trial). PI: Dr. Md. Yunus. (1978-79).

4. Transmission of Rotavirus. PI: Dr. M.H. Merson. Matlab Hospital (1978).

5. Relation of ABO blood group to Cholera in Matlab research area. Co-investigator (1978-80).

6. Comparative study of Oral Rehydration Solutions in childhood diarrhoea - Potassium 30 mmol vs 20 mmol and Base 30 mmol vs no Base. PI: Dr. M.R. Islam (1981-82).

OPERATIONS RESEARCH MANAGERIAL EXPERIENCE

1. Development of maternal morbidity surveillance programme in 22 villages among 2500

women of child bearing age Administered health programme in Natural fertility research programme in Matlab (15 Health assistants) during 1986-89.

2. Management of Nandipara Staff clinic based health programme on longitudinal studies on vitamin A supplementation among mother after delivery (1987-90)

3. Chairman, Research Subcommittee , Bangladesh Breastfeeding Foundation, currently funded by World Bank through BINP. Responsibilities include, formal development of request for research proposals (RFPs) on breast feeding (8 completed, disseminated, and 5 new began), helping capacity building in national sector, arrange grant competition, selection and review process and project administration , monitoring, report reviews and quality control assurance.

4. Growth monitoring project Of ICDDR,B in Meheran Matalab for regular monitoring of data collection, staff training, field supervision during 1986-89.

5. Research project development, administration, supervision, donor and international reviews interaction continued in ICDDR,B.

6. Govt of Bangladesh initiated (MOHFW) Bangladesh Integrated Nutrition Project, writing up continuous development at various stages and continue operations research through ICDDR,B and still working in assisting policy issues in central Steering committee (1993-98).

7. Guidance to research projects of the post graduate students in nutrition from home and abroad for the academic courses e.g.

   M.Sc.
   M.Phil
   Ph.D

Research experience as PRINCIPAL INVESTIGATOR

1. Effect of anti-secretory drug on Cholera. G.H. Rabbani, S.K. Roy (1982-83).

2. Risk of hypernatremia in young children with ORS containing Sodium 90 mmol. S.K. Roy, R.E. Black (1979-80).

3. Subsequent mortality of hospitalized children according to their nutritional status. S.K. Roy (1978-81).

4. Characteristics of diarrhoea in typhoid fever. S.K. Roy (1982-83).

5. Transport of water and electrolytes in zinc deficient animal models in response to cholera toxin. Department of Human Nutrition, London School of Hygiene and Tropical Medicine, UK. S.K. Roy (1984-85).

6. Set up of facilities for management and research on persistent diarrhoea patients in the Treatment Centre of ICDDR,B (1986).

7. Net intake and nutrient absorption in persistent diarrhoea from a defined diet: metabolic balance studies in persistent diarrhoea patients during trial of a rice-based diet. S.K. Roy (1987-88).

8. Impact of zinc supplementation on intestinal permeability in malnourished Bangladeshi children with acute and persistent diarrhoea. A double blind randomized clinical trial in collaboration with London School of Hygiene and Tropical Medicine. S.K. Roy (1987-89).

9. Randomized trial of single dose vitamin A in mothers after delivery on the vitamin A levels in breastmilk. S.K. Roy, A. Islam, A. Molla (1987-89).

10. Impact of zinc and vitamin A in immunity of moderately malnourished children in double blind randomized trial. S.K.Roy. Tasnim Azim (1994-97).

11. Bioavailability of zinc from two different diets in persistent diarrhoea in Bangladeshi children using stable isotopes of zinc (1997---)

12. Efficacy of newly designed osmotic membrane for producing ORS and therapeutic milk as microbiologically safe and with appropriate electrolyte composition

EXPERIENCE IN RESEARCH DISCIPLINE

A. ***Growth & Morbidity studies:***

1. Growth monitoring, anthropometry and morbidity in birth cohorts up to 3 years.

2. Longitudinal studies in morbidity in large population of women of child bearing age for period of 3 years.

3. Growth and morbidity study in children after acute and persistent diarrhoea weekly follow up for 12 weeks with and without zinc supplementation.

4. Follow up on growth and morbidity in young children with vitamin A or zinc supplementation.

B. ***Clinical studies:***

1. Antibiotics trials in patients with cholera and shigellosis.

2. Descriptive study of diarrhoea in typhoid fever.

C. ***Oral rehydration studies:***

1. Clinical efficacy of citrate based ORS.

2. Prevention of hypernatremia from ORS with breast-feeding.

D. ***Studies on mortality:***

1. Subsequent risk of excess mortality in malnourished children after diarrhoea: cohort study with longitudinal follow-up.

E. ***Animal model studies***

1. On zinc deficiency and repletion, ultrastructural study, transport of electrolytes and water, *in-vivo* perfusion studies with cholera toxin using *radio-isotopes.*

F. ***Development of therapeutic diet*** for persistent diarrhoea patients.

G. ***Metabolic balance studies*** on macronutrient absorption in persistent diarrhoea.

H. ***Micronutrient research***:

1. Pioneering study on Zinc supplementation in children with acute and persistent diarrhoea -- clinical, biochemical and community study.

2. Vitamin A study with postpartum supplementation showing effect on breastmilk retinol concentration community set up.

I. ***New technology introduction in ICDDR,B***: Application and development of intestinal permeability test.

1. Use of stable isotope ^{70}Zn and ^{67}Zn In collaboration with the Institute of Child Health and Institute of Food Research, UK.

2. Testing of newly designed osmotic sachets for preparing ready made ORS solution and milk product

PAPERS Published as First Author

1. **Roy SK**, Chowdhury AKMA, Rahaman MM. Excess mortality among children discharged from hospital after treatment for diarrhoea in rural Bangladesh. Br Med J 1983;287:1097-9.

2. **Roy SK**, Chowdhury AKMA, Rahaman MM. Excess mortality among children discharged from hospital after treatment for diarrhoea in rural Bangladesh (letter). Br Med J 1983;287:1553.

3. **Roy SK**, Rabbani GH, Black RE. Oral rehydration solution safely used in breast-fed children without additional water. J Trop Med Hyg 1984;87:11-3.

4. **Roy SK**, Speelman P, Butler T, Nath S, Rahman H, Stoll BJ. Diarrhoea associated with typhoid fever. J Infect Dis 1985;151:1138-43.

5. **Roy SK**, Haider R. Is nutritional status deteriorating in Bangladesh? Health Pol Plann 1988;3:325-8.

6. **Roy SK**. The importance of zinc. Food Laboratory Newsletter (Stockholm, Sweden) 1988;133:11-2.

7. **Roy SK**, Shome GP, Alam AN, Haider K. Chloramphenicol resistant *Salmonella typhi* (Case report). J Diarrhoeal Dis Res 1988;41-2.

8. **Roy SK**, Alam AN, Majid N, Khan AM, Hamadani J, Shome GP. Persistent diarrhoea: a preliminary report on clinical features and dietary therapy in Bangladeshi children. J Trop Pediatr 1989;35:55-9.

9. **Roy SK** and Tomkins A. The effects of severe zinc deficiency on growth, food intake, diarrhoea and pathological changes in intestinal tissue. Bangladeh J Nutr 1989;2:1-7.

10. **Roy SK**, Akramuzzaman SM. Understanding and management of persistent diarrhoea. Bangladesh Priv Med Pract J 1990;1:25-33.

11. **Roy SK**, Haider R, Akbar MS, Alam AN, Khatun M, Eeckels R. Persistent diarrhoea: clinical efficacy and nutrient absorption with a rice based diet. Arch Dis Child 1990;65:294-7.

12. **Roy SK**, Akramuzzaman SM and Akbar MS. Persistent diarrhoea: total gut transit time and its relationship with nutrient absorption and clinical response. J Pediatr Gastroenterol Nutr 1991;13:409-14.

13. **Roy SK**, Akramuzzam SM, Haider R, Majid N, Khatun M, Akbar MS, Alam AN. Persistent diarrhoea: factors affecting absorption and clinical prognosis during management with a rice-based diet. Acta Pediatr 1991;81 (suppl 381):139-43.

14. **Roy SK**. Effect of zinc supplementation in patients with acute and persistent diarrhoea. Glimpse (ICDDR,B Newsletter) 1991;13:3.

15. **Roy SK**, Behrens RH, Haider R, Akramuzzaman SM, Mahalanabis D, Wahed MA, Tomkins AM. Impact of zinc supplementation on intestinal permeability in Bangladeshi children with acute diarrhoea and persistent syndrome. J Pediatr Gastroenterol Nutr 1992;15:289-96.

16. **Roy SK**, Rahman M, Mitra AK, Ali M, Alam AN, Akbar MS. Can mothers identify malnutrition in their children?. Health Pol Plann 1993;8:143-9.

17. **Roy SK**, Akramuzzaman SM, Haider R, Khatun M, Akbar MS, Eeckels R. Persistent diarrhoea: efficacy of a rice-based diet and role of nutritional status in recovery and nutrient absorption. Br J Nutr 1994;71:123-34.

18. **Roy SK**, Tomkins AM. Zinc diarrhoea link. Dialogue on Diarrhoea 1994;56:7.

19. **Roy SK,** Zinc Supplementation in the treatment of childhood diarrhoea. Indian J Paediatr. 1995;62:181-193.

20. **Roy SK,** Tomkins AM, Akramuzzaman SM . Current management of persistent diarrhoea and malnutrition in developing countries. Hong Kong J Paediatr. 1995;1(suppl):100-113.

21. **Roy SK,** Haider R. Persistent diarrhoea: Appropriate dietary management. Dialogue on Diarrhoea, issue 37, June 1989.

22. **Roy SK**, Islam A,Molla A, Akramuzzaman SM, Jahan F, Fuchs G. Impact of single megadose of vitamin A at delivery on breastmilk of mothers and morbidity of their infants. Eur J Clin Nutr 1997;51:302-307.

23. **Roy SK**, A M Tomkins S M Akramuzzaman, R H Behrens R Haider, D Mahalanbis, G Fuchs. Randomized controlled trial of zinc supplementation in malnourished Bangladeshi children with actue diarrhoea. Arch Dis Child 1997;77:196-200.

24. **Roy SK** and Tomkins A.M. Micronutrients and diarrhoea. In: Proceedings of Pediatric Gastroenterology Workshop, Indian Medical Association, West Bengal chapter, Calcutta 6-7 September, 1997; 16-22.

25. **Roy S.K**. Complementary feeding in children of South Asia. UNICEF Special Publications. Regional Office of South Asia, Kathmandu, 1997.

26. **Roy S.K.,** Islam A, Ali R, Islam K.E, Khan R. A, Ara S. H, Saifuddin N.M, Fuchs G.J. A randomized clinical trial to compare efficacy of erythromycin, ampicillin and tetracycline in the treatment of cholera in children. Trans. Royal. Soc. 1998 Vol;92: 460-2.

27. **Roy S.K.**, F. Khatun, N. R. Sarker , N.M. Saifuddin , K.E.Islam, M.A. Malek, M.A.Wahed, Fuchs GJ. A randomized Clinical Trial of Zinc and Vitamin A in undernourished Children with persistent Diarrhoea (PD) in Bangladesh. In : Abstract Book of 5th Joint Meeting of ESPGHAN and NSPGN, Tulose, France, 1998.

28. **Roy S.K.,** Childhood Diarrhoea. In : Child Health Dialougue. AHRTAG. 1998

29. **Roy S.K.,** Tomkins A.M., Akramuzzaman S.M., Haider R, Behrens R.H., Fuchs G. Impact of zinc supplementation on persistent diarrhoea in malnourished Bangladeshi Children. Acta Pedeatrica. 87;1235-9:1998.

30. **Roy S.K.**, A.M. Tomkins, R. Haider, R.H. Behrens, S.M. Akramuzzaman, D.Mahalanbis, G.J. Fuchs. impact of zinc suplementation on subsequent growth and morbidity in bangladeshi children with acute diarrhoea. European Journal of Clinical Nutrition (In press).

31. **Roy S.K.** The role of zinc in childhood diarrhoea: Are we yet there? Oxford University Press (In press)

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26.. **Roy SK**, Speelman P, Butler T, Nath S, Rahman H and Stoll BJ. Diarrhoea associated with typhoid fever. In: Speelman P, ed. Infectious diarrhoea in Bangladesh: pathophysiological and etiological aspects. Amsterdam, 1986;83-93.

27. **Roy SK**, Islam A, Molla A, Akramuzzaman SM. Dynamics of vitamin A levels in the breastmilk of mothers of low socio-economic status in Bangladesh. In: Ian-Darton-Hill, ed. Vitamin A deficiency in Bangladesh: prevention and control. Dhaka: Helen Keller International & VHSS, 1989:107-15.

28. **Roy SK**, Haider R, Tomkins A, Behrens RH. Effect of systemic infection on intestinal permeability in Bangladeshi children with persistent diarrhoea. *In*: Lifschitz CH, Nichols BL, eds. Malnutrition in chronic diet-associated infantile diarrhoea: diagnosis and management. San Diego: Academic Press, 1990:385-9.

29. **Roy SK**. Persistent diarrhoea. In: Hussain M, ed. Paediatric diagnostic approach. Dhaka: Mrs. Shermin Manzoor, 1993:71-6.

30. **Roy SK**, Tomkins AM. Persistent diarrhoea: role of zinc and other micronutrients. In: McNeish AS, Mittal SK, Walker-Smith JA, eds. Recent trends in diarrhoea and malnutrition. New Delhi, India, 1993:52-63.

31. Tomkins A, Behrens R, **Roy SK**. The role of zinc and vitamin A deficiency in diarrhoeal syndromes in developing countries. In: Proceedings of the Nutrition Society, Trinity College, Dublin 15-19 July, 1992.

PAPERS PUBLISHED AS CO-AUTHOR

32. Butler T, Islam M, Islam MR, Azad AK, Huq MI, Speelman P, **Roy SK**. Isolation of *Yersinia enterocolitica* and *Y. intermedia* from fatal cases of diarrhoeal illness in Bangladesh. Trans R Soc Trop Med Hyg 1984;78:449-50.

33. Butler T, Knight J, Nath SK, Speelman P, **Roy SK**, Azad MAK. Typhoid fever complicated by intestinal perforation: a persisting fatal disease requiring surgical management. Rev Infect Dis 1985;7:244-56.

34. Akbar MS, **Roy SK**. Combating nutritional disorder: what promises? Dhaka Shishu Hosp J 1988;4:18-25.

35. Khatun F, Nahar N, **Roy SK**. Acute diarrhoea: an evaluation of non-host factors in children of Bangladesh. Bangladesh J Nutr 1989;2:26-35.

36. Haider R, **Roy SK**. Persistent diarrhoea: appropriate dietary management. Dialogue on diarrhoea 1989:37.

37. Behrens RH, Tomkins AM, **Roy SK**. Zinc supplementation in diarrhoea: fortification against malnutrition (letter). Lancet 1990;336:8712.

38. Akbar MS, **Roy SK**. Persistent diarrhoea and its management. Touch 1991; 10:69-71.

39 Akbar MS, **Roy SK**, Banu N. Persistent diarrhoea: management in algorithmic approach using a low cost rice based diet in severely malnourished Bangladeshi children. J Trop Pediatr 1993;39:332-7.

40. Rahman M, Mitra AK, Ali M, Alam AN, Akbar MS, **Roy SK**. Maternal Health as a determinant of the nutritional status of the child. J Trop Pediatr 1993;39:86-8.

41. Haider R, Khan AKA, **Roy SK**, Dewan N, Alam AN, Mahalanabis D. Management of acute diarrhoea in diabetic patients using oral rehydration solutions containing glucose, rice or glycine. Br Med J 1994;308:624-6.

42. Khatun F, Ahmed K, Chowdhury SAR, **Roy SK**. Protein energy malnutrition and metabolism of growth hormone in Bangladeshi children. Bull Bangladesh Med Res Council.

43. Khatun F, Nahar N, **Roy SK**. Acute diarrhoea: characteristics and determinants in paediatric population of Dhaka city. Dhaka Shishu Hosp J 1988;4:50-7.

44. Tomkins A.M, Behrens RH,**Roy SK.** Importance of micronutirents in diarrhoea. Honk Kong J Peadiatr. 1995;1(suppl):

45. Tomkins A.M, Behrens RH, **Roy.SK**. Role of vitamin A deficiency in diarrhoeal syndrome. Proc. Nutr. society. 1993. 52;131-142

THESIS AND DISSERTATIONS AS INTERNAL REPORTS

1. **Roy SK**. The role of zinc deficiency in host response to diarrhoeal pathogens. M.Sc. Dissertation, University of London, 1984.

2. **Roy SK**. Impact of zinc deficiency on intestinal transport of water and electrolytes with and without secretory stimulus of *V. cholerae* enterotoxin. UNU project report. Department of Human Nutrition, LSHTM, University of London, 1985.

3. **Roy SK**. Impact of zinc supplementation on Bangladeshi children suffering from acute and persistent diarrhoea. Ph.D. Thesis, University of London, 1990.

Contribution in research

RESEARCH LEADING TO INTERNATIONAL AND NATIONAL IMPACT

A) "**Excess mortality after discharge from diarrhoeal hospital**" was the first article showing rehydration is not enough for malnourished children with diarrhoea and there is 14 times higher risk of mortality and was published in British Medical Journal in 1983.

This paper was taken up by Ford and Rockefeller foundation scholars and the call was reflected with the response of WHO CDD programme to take a global initiative to integrate nutritional management of diarrhoea and establishment of a post-diarrhoeal nutrition rehabilitation centre at ICDDRB.

B) **Persistent diarrhoea management with local diet** and a dietary algorithm of management was published during 1986-90 (Arch Dis Chld, J Trop Ped, JPGN 1991, Br. J Nutr 1994) led formal initiative of WHO to emphasize recognition of this syndrome with high priority followed by a multi-centre research on development of algorithm of low cost local diet. My efforts has improved ICDDR,B care of persistent diarrhoea directly and practices in many hospitals.

C) Pioneering work on **supplementation of zinc in diarrhoeal disease** presented in many international conferences and published in Lancet 1990, JPGN in 1992, Archives Dis Child 1997, has stimulated many research work with support of UNICEF and WHO . Three global consensus meetings have already been held and zinc is being placed with priority in diarrhoeal management.

D) **Is nutritional status deteriorating in Bangladesh** ? , an article published in 1988 in Health Policy and Planning, drew attention of UNICEF and World Bank and Govt of Bangladesh and triggered to take a remedial measure. The BINP project was thus initiated and launched without delay. The project is rapidly showing significant progress.

E) Study on **postpartum vitamin A supplementation to mothers** showing increased Breast milk retinol concentration up 6 month postpartum (1989 HKI Book), led later work (R.Stolfuz) and widely practiced. BINP project recently introduced high potency Vitamin A capsule in postpartum after the Bangladesh data has been available through peer reviewed journal (Eur J Clin Nutr, 1997).

PAPERS IN PROCESS OF PUBLICATION

1. **Roy SK**, Tomkins A.M and GJ Fuchs. The role of zinc supplementation in childhood diarrhoea: are we there yet ? In Proceedings of IVth Commonwealth Congress on Diarrhoea and Malnutrition, Karachi Nov 22-24, 1997 (Submitted)

2. **Roy SK,** Azim T, Fuchs G, Akramuzzaman SM. Impact of zinc and vitamin A on immunity in malnourished children.

3. Kahtun F, **Roy SK,** Fuchs G, Sarker NR, Islam QE, Saifuddin NM, Malek A, Wahed MA. Randomized control clinical trial of zinc and vitamin A in persistent diarrhoea in Bangaldeshi children.

4. **Roy SK**, Akramuzzaman SM. Persistent diarrhoea: Significance of breast-milk in prognosis and recovery.

5. **Roy SK**, Tomkins AM and BS Drasar. Intestinal response to *Vibrio cholerae* enterotoxin during experimental zinc deficiency.

6. **Roy SK**. Nutritional management of acute and persistent diarrhoea.

7. **Roy SK**, Mamun S, Ashraf H, Miraj AM, Sarker SA and Alam AN. Characteristics of persistent diarrhoea in hospitalised children of Bangladesh.

8. **Roy SK**. Impact of maternal nutritional status on breast-milk and infant nutrition in Bangladesh.

9. **Roy SK**, Akramuzzaman SM, Majid N, Haider R, Alam AN. Comparison of coconut oil with soybean oil in outcome of persistent diarrhoea.

10. **Roy SK**, Rahman M, Mitra AK, Ali M, Alam AN, Akbar MS, Nutritional status determining hospitalization of children.

11. **Roy SK,** Nafisa M. Saifuddin, Taniya Sharmeen. Zinc and Other micronutrients in regulation in of intestinal function in developing countries perspectives. (Submitted to the journal of Trace Elements in Experimental Medicine. Vol 11 No. 4, 1998)

12. **Roy SK,** Tomkins AM, Behrens RH, Akramuzzaman SM, Haider R, Wahed MA, Ara BF. Role of serum vitamin A and zinc on intestinal permeability in children with acute diarrhoea.

13. **Roy SK,** Tomkins AM, Mannan MA, Akramuzzaman SM. Haider R. Behrens RH, Ara BF, Fuchs G. Impact of vitamin A supplementation on subsequent growth and in children presenting with persisrent diarrhoea (PDS) in Bangladesh.

14. **Roy SK,** Tomkins AM, Haider R, Akramuzzaman SM, Behrens R, Khan MA. Interrelationship of the nutritional indicators, enteropathogenics and feeding practices in Bangladeshi children presented with acute diarrhoeal illness.

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4. **Roy SK**, Haider R, Akbar MS, Khatun M, Alam AN, Majid N. Persistent diarrhoea, clinical features and management in urban Bangladeshi children. Book of Abstract, 4th Asian Conference on Diar rhoeal Diseases, Colombo, 1987.

5. **Roy SK**, R. Haider, A.N. Alam, R. Behrens and A.M. Tomkins. Persistent diarrhoea syndrome (PDS) in Bangladeshi children in Abstracts of the XIIth International Congress for Tropical Medicine and Malaria, Amsterdam, Sept. 1988.

6. **Roy SK** and Tomkins AM. Malnutrition and risk of diarrhoea. XIIth International Congress for Tropical Medicine and Malaria,18-23 1988, Amsterdam, The Netherlands.

7. Haider R, **Roy SK**, M. Khatun, A.N. Alam, R. Eeckels. Net intake and absorption of nutrients from a defined diet in persistent diarrhoea in Abstracts of the XIIth International Congress for Tropical Medicine and Malaria, Amsterdam, Sept. 1988.

8. **Roy SK**, Haider R, Tomkins AM and Behrens R. The effect of systemic infection on intestinal permeability in Bangladeshi children with persistent diarrhoea in Abstracts of the Human Nutrition Conference, Houston, Texas, USA, Nov. 1988.

9. **Roy SK**, Tomkins AM, Haider R and Beherons RH. Effects of zinc supplementation on persistent diarrhoea in Bangladeshi children. XIVth International Congress in Nutrition, Seoul, 1989.

10. **Roy SK**, Shahrier M, Ashraf H ,Akramuzzaman SM ,Haider R. Characteristics of persistent diarrhoea patients and their response to dietary management. Book of abstract, Vth Asian conference on Diarrhoea. Kathmandu, Nepal 1989.

11. **Roy SK**, Haider R, Akramuzzaman SM,Tomkins A,M Beherens RH. Zinc supplementation in persistent diarrhoea : A Clinical trial for evaluation of benefits in young children.5th Asian congress of Diarrhoeal disease. Kathmandu, Nepal 1989.

12. **Roy SK**, Islam A, Molla A,Akramuzzaman SM. Dynamics of vitamin A levels in the breast-milk of mothers of low socio-economic status in Bangladesh. Abstract in XIII th IVACG meeting, Kathmandu, Nepal 1989.

13. **Roy SK**, Haider R, Tomkins AM, Akramuzzaman SM, Beherens R.Impact of dwelling pattern on nutritional performance of the infants and children who contracted persistent diarrhoea. Conference on Nutrition and national development in Bangladesh, SCF Dhaka, Bangladesh 1989.

14. Haider R, **Roy SK**, Akramuzzaman SM, Akbar MS. Nutritional indices: Determinants of prognosis and macronutrient absorption in persistent diarrhoea in Bangladeshi children. Vth Asian congress of Diarrhoeal Disease.Kathmandu, 1989.

15. **Roy SK** , Haider R, Tomkins A and Behrens R. Effect of zinc supplementation on intestinal permeability and morbidity among Bangladeshi children with persistent diarrhoea syndrome.(Abstract). Proceedings of the Nutrition Society 1990;49(2):60.

16. **Roy SK**, Haider R, Akramuzzaman SM, Behrens and Tomkins AM. Relationship between nutritional status and urinary excretion of lactulose and mannitol among Bangladeshi children with persistent diarrhoea syndrome (PDS).(Abstract). Gut;1990. Presented in the British Society of Gastroenterology; Spring Meeting at the University of Warwick, March 1990.

17. **Roy SK**, Haider R, Behrens R, Tomkins AM. Impact of zinc supplementation on intestinal permeability in Bangladeshi children with acute diarrhoea (AD) and persistent diarrhoea syndrome (PDS). Residential Meeting of the Royal Society of Tropical Medicine and Hygiene and other European Tropical Societies. 2-5 July 1990, Cambridge, England.

18. **Roy SK**, Haider R, Akramuzzaman S.M, Behrens R, Tomkins AM.Differential impact of diarrhoeal pathogens on intestinal permeability in Bangladeshi children with diarrhoea. Residential Meeting of the Royal Society of Tropical Medicine and Hygiene and other European Tropical Societies. 2-5 July 1990, Cambridge, England.

19. **Roy SK**, Akramuzzaman SM, Haider R, Behrens R, Tomkins AM.Impact of zinc supplementation on subsequent growth and morbidity in Bangladeshi children with acute diarrhoea. Residential Meeting of the Royal Society of Tropical Medicine and Hygiene and other European Tropical Societies. 2-5 July 1990, Cambridge, England.

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21. **Roy SK**, Tomkins AM, Drasar BS. Electrolyte Transport in-vivo Perfusion of Small Intestinal Segments of Zinc-Deficient Animal Models. Programme & Abstracts, National Biochemistry Conference 21 Dec 1991.

22. **Roy SK**, Haider, R, Behrens R, Tomkins AM, Mahalanabis D. Impact of Zinc Supplementation on subsequent growth, morbidity and mortality in Bangladeshi children with the Persistent Diarrhoea Syndrome (PDS). Abstracts of Scientific Papers, Commonwealth Conference on Diarrhoea and Malnutrition, Nov 29-Dec 1, 1991.

23. **Roy SK**, Haider R, Akramuzzaman SM, Majid N, Rahman H, Alam AN. Effect of Coconut oil and soybean oil in Persistent Diarrhoea patients presenting with malnutrition. Book of Abstracts and Programmes, Fifth Bangladesh Nutrition Conference, Dhaka, Bangladesh August 10-12, 1991.

24. **Roy SK**, Tomkins AM, Akramuzzaman SM, Haider R, Behrens RH. Intestinal Mucosal permeability: Is it affected by the nutritional status of children during diarrhoea? Book of Abstracts and Programmes, Fifth Bangladesh Nutrition Conference, Dhaka, Bangladesh August 10-12, 1991.

25. **Roy SK**, Islam A, Molla A, Akramuzzaman SM. Impact of vitamin A supplementation during delivery on subsequent growth and morbidity of the breastfed infants. Annual Scientific Conference, 26-28 October, 1991, Dhaka.

26. **Roy SK**, Haider R, Akramuzzaman SM, Behrens R, Tomkins AM. Impact of zinc supplementation on subsequent growth and morbidity in Bangladeshi children presenting with acute diarrhoea. Annual Scientific Conference, 26-28 October, 1991, Dhaka.

27. **Roy SK**, Haider R, Akramuzzaman SM, Khatun M, Akbar MS. Persistent Diarrhoea: Role of Nutrition in prognosis and nutrient absorption in Bangladeshi children presenting with acute diarrhoea. Annual Scientific Conference, 26-28 October, 1991, Dhaka.

28. **Roy SK**, Haider R, Akramuzzaman SM, Behrens R, Tomkins A. Prevalence of enteric pathogens in Bangladeshi children with acute (AD) or persistent diarrhoea (PD). Annual Scientific Conference, 26-28 October, 1991, Dhaka.

29. Haider R, **Roy SK**, Tomkins AM, Akramuzzaman, A.N.Alam. Differences in growth of Bangladeshi children after acute and persistent diarrhoea. (Abstract). First International Scientific Conference of Bangladesh college of Physicians and Surgeon. 1991 Jan, Dhaka.

30. **Roy SK**, Akramuzzaman, SM Tomkins AM, Haider R, Behrens RH, Mahalanabis D. Impact of Zinc Supplementation on subsequent growth and morbidity in Bangladeshi children presenting with acute diarrhoea (AD). Book of Abstracts and Programmes, Fifth Bangladesh Nutrition Conference, Dhaka, Bangladesh August 10-12, 1991.

31. Akbar MS, **Roy SK**, Banu N. Efficacy of a rice-based low costs diet in the management of persistent diarrhoea in Bangladeshi children. Annual Scientific Conference, 26-28 October, 1991, Dhaka.

32. **Roy SK**, Akramuzzaman SM, Tomkins AM, Haider R, Behrens RH, Mahalanabis D. Impact of Zinc Supplementation on subsequent growth and morbidity in Bangladeshi children presenting with persistent diarrhoea (PD).

33. **Roy SK**, Tomkins AM, Haider R, Behrens RH, Akramuzzaman SM, Mahalanabis D. Impact of zinc supplementation on subsequent growth and morbidity in Bangladeshi Children Presenting with acute diarrhoea (AD) and persistent diarrhoea syndrome (PDS). BPA Conference 1991, Dhaka , 15- 17 November 1991.

34. **Roy SK**, Haider R, Behrens R, Tomkins AM. Impact of zinc supplementation on intestinal permeability in Bangladeshi children with acute diarrhoea (AD) or persistent diarrhoea syndrome(PDS). Annual Scientific Conference, 26-28 October, 1991, Dhaka.

35. **Roy SK**, Rahman M, Mitra AK, Ali M, Akbar MS, Alam AN. Mothers' ability to identify malnutrition in their children. Book of Abstracts and Programmes, Fifth Bangladesh Nutrition Conference, Dhaka, Bangladesh August 10-12, 1991.

36. **Roy SK**, Akramuzzaman SM, Tomkins AM, Haider R, Behrens RH, Mahalanabis D. Impact of zinc supplementation on subsequent growth and morbidity in Bangladeshi children presenting with persistent diarrhoea (PD). Book of Abstract, Commonwealth Conference, New Delhi, Nov, 1991.

37. Rahman M, Akbar MS, Alam AN, Mitra AK, Ali M, **Roy SK**. Relationship between the nutritional status of children and their mothers. Annual Scientific Conference, 26-28 October, 1991, Dhaka.

38. Rahman M, Mitra AK, Ali M, Alam AN, Akbar MS, **Roy SK**. Studies on Nutritional Status determining hospitalization in children. Book of Abstracts and Programmes, Fifth Bangladesh Nutrition Conference, Dhaka, Bangladesh August 10-12, 1991.

39. Rahman M, Mitra AK, Ali M, Alam AN, Akbar MS, **Roy SK**. Maternal health as a determinant of the nutritional status of the child. Book of Abstracts and Programmes, Fifth Bangladesh Nutrition Conference, Dhaka, Bangladesh August 10-12, 1991.

40. **Roy SK**. Role of micronutrients in infection. Plenary lecture in XIth Biennial International Pediatric Conference of PPA. Karachi, Feb 3-7, 1992.

41. **Roy SK**. Role of Microbiologist in Primary Health Care in Book of Abstract. Xth Annual Conference of Bangladesh Soc. of Microbiology. Feb 6, 1992.

42. **Roy SK**, Tomkins AM, Behrens RH & Haider R. Abstracts: Effect of zinc supplementation in patients with Acute Diarrhoea. Book of Abstracts. XIth Bienneial International Pediatric Conference, Karachi, Feb 3-7, 1992.

43. Akbar MS, **Roy SK**, Banu N. Abstracts: Efficacy of rice based low cost diet in persistent diarrhoea. *In:* Book of Abstracts, XIth Bienneial International Pediatric Conference, Feb 3-7, 1992. Karachi, Pakistan.

44. **Roy SK**, Tomkins AM, Haider R, Behrens RH, Akramuzzaman SM. *In:* Abstracts: The importance of zinc deficiency in stunting and morbidity. XV International Congress of Nutrition, Adelaide (Australia), Sep 26 to Oct 1, 1993:713.

45. **Roy SK**, Akramuzzaman SM, Haider R, Tomkins AM, Behrens R. Abstracts: Feeding practices in children who present with acute diarrhoeal illness. 8th Asian Congr Pediatr, New Delhi, India Feb 6-11,1994;

46. **Roy SK**, Tomkins AM, Haider R, Behrens RH, Akramuzzaman SM, Mahalanabis D, Fuchs G. Impact of zinc supplementation on subsequent growth and morbidity in children presenting with persistent diarrhoea syndrome (PDS) in Bangladesh. In: Abstracts of the 16th International Congress of Nutrition, Montreal, Canada, July 27-Aught 1, 1997:57(PR 483)

47. **Roy SK**, Tomkins AM, Akramuzzaman SM, Behrens RH, Haider R, Mahalanabis D, Fuchs G. Impact of zinc supplementation on clinical outcome of malnourished children with acute diarrhoea. In: Abstracts of the 16th International Congress of Nutrition, Montreal, Canada, July 17-August 1, 1997:57(PR 484)

48. **Roy SK**, Akramuzzaman SM, Haider R, Mahalanabis D, Wahed MA, Tomkins AM, R.Behrens. Relationship between serum vitamin A and intestinal permeability in children with acute diarrhoea In Programme and abstract, ASCON V ICDDR,B, Dhaka 13-14 January 1996, P36.

49. **Roy SK,** Tomkins AM, Akrauzzaman SM, Haider R, Behrens RH, Mahalanabis D. Persistent diarrhoea: Impact of zinc supplementation in Bangladeshi children. In Programme and Abstract , Zinc and Health in South Asia: Symposium and Workshop, June 15-16, 1997.

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51. **Roy SK,** Talylor L, Tomkins AM, Seal AM. Development of an osmotic device for the production of microbiologically safe oral rehydration solution and therapeutic milk from contaminated water. In Abstracts, 16th International conference of Nutrition, Montreal, Canada, July 27- August 1997, PM 409..

52. **Roy SK,** Akramuzzaman SM, Tomkins AM, Haider R, Behrens R. Vitamin A and intestinal permeability in children with acute diarrhoea. In abstract Book IVth International Congress of International Society for Trace Elements Research in Humans, Taormina, Sept 25-28, 1995.

53. **Roy SK**, Akramuzzaman SM, Haider R, Mahalanabis D, Behrens RH, Wahed MA, Tomkins AM. Zinc supplementation in diarrhoea: Nutritional implications on clinical recovery and intestinal permeability (A166). In Abstracts , IIIrd Commonwealth Congress on Diarrhoea and Malnutrition, Hongkong, 11-14 November 1994.

54. **Roy SK**, The role of zinc in childhood diarrhoea, are we yet there? In Scientific programme and abstract , p22, November 21-24, 1997, Karachi, Pakistan.

55. **Roy SK**, Akramuzzaman, Tomkins AM, Wahed MA, Fuchs GJ. Relationship of vitamin A and growth of children after diarrhoea. In Abstract XVIII IVACG meeting, Cairo, Egypt 22-26 September, 1997.

56. **Roy SK,** and AM Tomkins. Management of PEM in the developing countries. In "Clone, cure and Control" Tropical health for the 21st century. 2nd European Congress on Tropical Medicine. September 14-18,1998; Liverpool. Uk

57. **Roy SK,** A. Tomkins, G.J Fuchs. Zinc and Other micronutrients in regulation in regulation of intestinal function in developing countries perspectives. The journal of Trace Elements in Experimental Medicine. Vol 11 No. 4, 1998.

58. **Roy S.K,** M.A. Mannan, A. M. Tomkins, R.H. Behrens, R. Haider, S.M. Akramuzzaman. Serum Vitamin A level and physical growth of Children During Catch-up Growth After Acute Diarrhoeal Episode. The journal of Trace Elements in Experimental Medicine. Vol 11 No. 4, 1998.

59. Roy SK, Tasnim Azim, George Fuchs, S.M.Akramuzzaman, S A.Ahmed, K.E.Islam, D. Mahalanabis, and rahman, A study on immunological effect of vitamin A and zinc in A placebo controlled 4 cell trial. In Abstract XIX IVACG meeting, Durban, South Africa 8-11 March,1999.

ON GOING RESEARCH PROJECTS (Principal Investigator)

1. Zinc balance and bioavailability from two different diets for children with persistent diarrhoea syndrome in Bangladesh using stable isotope ^{70}Zn and ^{68}Zn (IFR UK)

2. Evaluation of an osmotic ultrafiltration device for the preparation of therapeutic feeds.

3. Evaluation of the newly designed Osmotic Bags for preparation of Oral rehydration solution (Passed by the RRC ; a collaborative project with Prof. A.Tomkins, Funded by UCB Limited, UK)

4. Effect of zinc supplementation on the immune and inflammatory responses of children to Shigella flexneri infection, and correlation with clinical severity of illness and growth following recovery. (Collaborative with Rubhana Rakib LSD).

5. Effective means to address moderately malnourished children within BINP communities.

Projects waiting for funds:

1. Impact of zinc and copper supplementation on micronutrient balance in malnourished children with acute diarrhoea.

2. Clinical trial of zinc supplementation in cholera patients.

3. Clinical and nutritional impact of vitamin A and zinc supplementation in acute diarrhoea in children. (developed with JHU)

4. Effect of different antibiotics in the treatment of severe infection (clinical septicemia/meningitis) in the special unit of ICDDR,B hospital (Reviewed).

5. The impact of vitamin A supplementation on intestinal function and systemic acute phase protein responses among malnourished children with persistent diarrhoea syndrome in Bangladesh (Reviewed).

6. Measure the effectiveness of different nutritional intervention for improvement of birth weight through improving maternal nutrition status.

7. Impact of iron supplementation in women of child bearing age on reduction of anaemia, improvement in iron.

8. Fortification of weaning foods with Vitamin A and iron with sustainable food technology (Developed)

9. Potential of rural poor women to improve micronutrient status through increased intake of home grown foods and testing the sustainability (developed).

10. Zinc and vitamin A supplementation in children with acute diarrhoea

11. Empowerment of rural mothers for domiciliary management of persistent diarrhoea with zinc and vitamin A (developed).

12. Impact of de-worming on children with supplementary feeding and integrated nutrition programme in Bangladesh (developed).

13. Feasible means to address moderately malnourished children within BINP communities.

14. Anthropological approach of intensive nutrition intervention reduce malnutrition among female adolescents in a rural community.

ICDDR,B CENTRE ACTIVITY

1. **Member CSD Advisory committee**

2. **Deputy Head Nutrition Working Group**

3. **Deputy Director BINP Operations research project**

4. **Unit Head, Clinical Unit -I.**

COLLABORATIVE ACTIVITIES

1. With international and national organizations in programmes in health and nutrition.

2. As General Secretary of Bangladesh Breastfeeding Foundation (BBF).

3. Chairman, Research Sub Committee, BBF . Administration of 13 research projects on breastfeeding commissioned to research institutions /agencies in Bangladesh.

4. Project development with the M.Phil/Ph.D students of Institute of Nutrition and Food Science. University of Dhaka.

5. Project development with M.Sc. Nutrition students and supervision for thesis works.

6. Project adviser for Essential National Health Research (ENHR) projects.

INSTITUTIONAL COLLABORATION IN TEACHING, CONSULTANCY & RESEARCH DEVELOPMENT:

Research

Centre for Human Nutrition, London School of Hygiene and Tropical Medicine, UK

Norwich Agriculture and Food Research and Laboratory , UK.

Centre for International Child Health, Institute of Child Health, London, UK

Department of Pediatrics, Johns Hopkins University, Baltimore.

TECHNICAL ASSISTANCE TO GOVT OF BANGLADESH AND NATIONAL INSTITUTIONS

BRAC: (Bangladesh Rural Advancement Committee), Dhaka

1. Reviewer of research projects

2. Reviewer of project reports

Essential National Health Research, Bangladesh (ENHR,B)

1. Member, Working group :

2. Supervisor of research projects:

3. Faculty Member, Research Methodology Courses:

Institute of Child Health, Dhaka Shishu Hospital, Dhaka

1. Teaching in paediatric nutrition

College of Home Economics, Dhaka University, Dhaka.

1. Teaching in Community and Clinical Nutrition In M.Sc Nutrition and food science

2. Supervisor of thesis in M.Sc In Nutrition and Food science

3. External examiner, M.Sc Nutrition, Dhaka University

4. Member, National Steering Committee of the **"Bangladesh Integrated Nutrition project" (BINP)**, Ministry of Health and family Welfare, Govt. of Bangladesh (World Bank supported project)

5. Member, Core Working Committee of ICN, **(International Conference on Nutrition-Bangladesh)**, Bangladesh Country Paper Finalization Committee National Plan of Action on Nutrition **(NPAN)**Committe, **MOHFW, GoB**

6. **Member Standing Technical Committee, Bangladesh National Scouts, Bangladesh National Nutrition Council: (BNNC)**

7. Member Research Review Committee, Bangladesh National Nutrition Council

8. **Periodical consultant** to **UNICEF,** Bangladesh

9. Technical Advisor to **Institute of Public Health Nutrition (IPHN), GoB**

COLLABORATION WITH NATIONAL PROFESSIONAL SOCIETIES:

Secretary general, Bangladesh Breast Feeding Foundation

General secretary: Nutrition Society of Bangladesh

Bangladesh Medical Association: Committee Member

Bangladesh Pediatric Association: Member

Bangladesh Public Health Association: member

Commonwealth Association of pediatric gastroenterology and Nutrition:
Executive council member

Task Force leader, Research task force: Common wealth association of pediatric gastroenterology and nutrion,

TEACHING AND ADVISORY EXPERIENCE:

1. Honorary teacher of the Bangladesh Institute of Child Health Bangladesh as Professor of Paediatric Nutrition for post graduate students, from 1989 .

2. Honorary Professor of Food and Nutrition for M.Sc. Food and Nutrition, CHE, University of Dhaka, since 1992.

3. Faculty member in the International training course on clinical management of diarrhoeal diseases ICDDR,B in the area of diarrhoea malnutrition since 1981.

4. Faculty member in National Training Courses on clinical aspect of diarrhoeal diseases, ICDDR,B since 1981.

5. Designed and conducted international training courses on persistent diarrhoea and nutrition , ICDDR,B 1988.

6. Course Director Integrated ODA grantee staff course on diarrhoea and ARI, 1992.

7. Supervisor to Post Graduate student as Nutrition fellow from home and abroad.

8. Joint supervisor, Ph.D. student, INFS, Dhaka University 1991.

PROMOTIONAL ACTIVITY

To younger scientists: Referred to get overseas higher training and helped to procure funds to a number of candidates.
Help promotion research of younger colleagues, and authorship.

EDITORIAL RESPONSIBILITY

1. Member of the Editorial Board, Bangladesh Journal of Nutrition, INFS
2. Member of the editorial board, Bangladesh Medical Journal, BMJ
3. Member of the Library Advisory Committee, ICDDR,B
4. Member of the Editorial Board, Bangladesh J Child Health, BPA.
5. Editor, Bangladesh Pusti Samachar (nutrition bulletin),NSB
6. Editor Health and Environment Bulletin, Doctors Forum
7. Editor, Breastfeeding Bulletin (BBF)

Member of Professional Societies:

1. Nutrition Society of Bangladesh.
2. Bangladesh Pediatric Association
3. Bangladesh Medical Association.
4. Bangladesh Public Health Association

ORGANIZATIONAL EXPERIENCES

1. Organized South Asian Zinc symposium 1997 , in ICDDR,B Dhaka with others.

2. Management of diarrhoea treatment centre of ICDDR,B.

3. Establishment of Persistent diarrhoea set up at ICDDR,B Hospital in 1986..

4. Founder Member of Bangladesh Breastfeeding Foundation.

5. Chairman, Research Sub-Committee, CPPBF (UNICEF), Dhaka, Bangladesh

6. Member, Governing Body of NGO. Society for Urban Health, 1991.

7. General Secretary, Nutrition Society of Bangladesh, 1994.

8. Organizer. 3 day 5th Bangladesh Nutrition Conference, 1991.

9. Organizing Secretary, 6th Bangladesh Nutrition Conference, 1993.

10. Organizing Secretary, 7th Bangladesh Nutrition Conference, 1997 with the Prime Minister to inaugurate.

10. Member, organizing committee, XIth national conference, Bangladesh society for microbiology, 6 February, 1992, Dhaka.

11. Scientific committee Annual Scientific Conference, ASCON ICDDR,B

12. Research Progeamme Organizer, CommonWealth Society Of Peadiatric gastroenterology and Nutrition

RESEARCH PRESENTATION IN INTERNATIONAL AND NATIONAL MEETINGS:

1. IXth Annual Congress of Indian Society of Gastroenterology, Calcutta, 1980.

2. 2nd Asian Conference of Diarrhoeal Diseases, Calcutta, 1983.

3. Conference on Diarrhoea and Malnutrition in Children of the Commonwealth, November 5-7th, 1984, London.

4. XIIIth International Congress of Nutrition, Brighton, 1985.

5. British Nutrition Society Meeting, Edinburgh, UK, 1985.

6. Vth Asian Conference on Diarrhoeal Diseases, Colombo, 1988.

7. National Conference on Vitamin A Research in Bangladesh, HKI, Dhaka, 1988.

8. Invited speaker in XIIth International Congress of Tropical Medicine, Amsterdam, 1988.

9. International college of paediatrics, annual seminar Bangladesh Chapter, 1987

10. Annual Conference of Bangladesh Paediatric Association 1988

11. Conference of International college of paediatrics, Bangladesh Chapter,1989.

12. XIIIth IVACG meeting at Kathmandu, Nepal ,1989.

13. Seminar on Nutrition and National Development, Save the Children Fund (UK), Dhaka, Bangladesh 1989.

14. Conference on Promotion and protection of Breast feeding in Bangladesh, 1989, divisional workshops.

15. National workshops on National nutrition policy, National Nutrition Council Bangladesh, 1989.

16. British Society of Gastroenterology, Spring meeting. University of Warwick, Coventry, UK, 29-31 August, 1990.

17. Royal Society of Tropical Medicine and Hygiene. Residential meeting Cambridge, 2-5 July 1990.

18. Nutrition Society meeting, University of Yorkshire, July 1990.

19. Invited speaker in international conference on persistent diarrhoea, Jan 16-20, 1991, Mombasa, Kenya.

20. Invited speaker in Commonwealth conference on diarrhoea and malnutrition. Role of trace elements in persistent diarrhoe.New Delhi Nov 29-Dec 1, 1991.

21. Invited Speaker in Xth International Biennial Pediatric Conference, PPA, Karachi February 3-7, 1992. Acted as Chairperson in the workshop on Child Nutrition in the XIth Biennial International Pediatr. Conference of PPA, Karachi 3-7 Feb, 1992.

22. Invited Speaker on Workshop on morbidity and stunting. Australia in the XVth International Congress of Nutrition, Adelaide, Australia 1993.

23. Invited member. Zinc consultative group, Brisbane, Australia, 1993.

24. National Conference on Campaign for promotion & protection of Breastfeeding, Bangladesh, 1991.

25. 5th Bangladesh Nutrition Conference, August 10-12, Dhaka, Bangladesh
6th Bangladesh Nutrition conference, Nov 27-29, 1993 Dhaka.

26. ICDDR,B Annual Scientific Conference, 26-28 October, 1991, Dhaka, Bangladesh.

27. Bangladesh Pediatric Association Conference, 15-17, November, Dhaka, Bangladesh.

28. Bangladesh Biochemical Society Conference, 21, December, BARC, Dhaka, Bangladesh. November 1991.

29. Continued Medical Education: Lecture to Chittagong Branch of Bangladesh Private Medical Practitioner's Association on "Nutritional Management of Diarrhoeal Patients", December 27, 1991.

30. Investigator; Co-ordinated Research Programme (CRP) in use of stable isotope in child health in developing countries. Boston, USA, 23-28 October, 1993.

31. Plenary speaker, 15th International Congress of nutrition, Adelaide, 1993.

32. 8th Asian Congress of pediatrics in New Delhi. Feb 6-11, 1994.

33. Invited speaker: "Current management of persistent diarrhoea and malnutrition in developing countries" III Commonwealth Conference of diarrhoea and malnutrition. Hongkong, November-1994.

34. Presentation of Research Findings in the Fourth International Congress of Trace Elements in Taormina, Italy during September 24-28, 1995.

35. Attended the workshop on "Essential National Health Research" in Kanchonaburi Province, Thailand during December 16-21, 1995.

36. Attend the Nutrition Initiative in South Asia on "Causes of stunting" meeting in Kathmandu; Nepal, March 7-10, 1996

37. WABA global forum, speaker, Thailand 1996.

38. Presentation in 16th International Congress of Nutrition, Montreal , July 27-August 1, 1997

39. Invited speaker on Micronutrients in diarrhoea in Pediatric Gastroenterology work shop of Indian Medical Association, Calcutta July 1997.

40. Presentation of Paper on vitamin A and growth of children in IVACG in Cairo, Egypt September 1997

41. Plenary speaker on zinc and diarrhoea, IVth Commonwealth congress on diarrhoea and malnutrition, Karachi, November 1997.

42. Speaker of Zinc and child health Workshop, Sanfransisco, USA, 15-18 April, 1998

43. Attended the Experimental Biology Meeting, Sanfransisco, USA 19-25 April, 1998

44. Presentation of paper on impact of vitamin A or Zinc on persistent diarrhoea: S.K.Roy, F.Khatun, N.R.Sarkar, N.Saifuddin, QE Islam, GJ Fuchs, 27-31 May, 1998 Toulouse, France

LINKAGE with Government of Bangladesh and Development partners:

Enhancing scientific and technical process of development and acceptance of Bangladesh Integrated Nutrition project by World Bank.

Negotiated process of contracting Operation research grant between BINP and ICDDR,B

Standing Technical Committee member, Bangladesh National Nutrition Council, MOHFW

Steering Committee,
UNICEF Health and Nutrition Sections
MOHFW

Research Grants held
1.ICDDR,B 1978-80
1.Welcome Trust , UK, 187-90
2.USAID 1986-87
3.USAID Cooperative agreements:1994-96
4.Centre fund PCC grant :1996-98
5.UCB osmotic, UK :1996-98, 98-99
6.USAID cooperative grant :1997-99
7.BINP WB Operations reseach: 1999-98
Internal adjusted budgets for many research work

Future Plan:

(1) Wish to establish a nutrition centre or department in ICDDR,B.

(2) Develop a clinical nutrition training course and a training team.

Research Projects: and Plans

1. Improving maternal Nutrition through defined nutritional intervention and study the impact on low birth weight in Bangladesh

2. Effect of zinc supplementation on micronutrient balance, in Bangladeshi children with acute and persistent diarrhoea.

3. Impact of zinc supplementation on growth and morbidity at community level on moderate and severely malnourished children in Bangladesh.

4. A study on immunological effect of Vit A and zinc in a placebo controlled clinic and community trial.

5. Micronutrient deficiency: a risk factor for case fatality in children with diarrhoea.

6. Appropriate nutritional management of severely malnourished patients with acute and persistent diarrhoea.

7. Comparison of the clinical and nutritional impact of a less expensive diet against a reference diet during persistent diarrhoea.

8. Nutritional rehabilitation of persistent diarrhoea patients after discharge from hospital.

9. Establish lactational management and evaluation of interventions on increase breast milk output.

10. Establishment of baseline survey of micronutrient status in children population in Bangladesh.

11. Nutrition surveillance of diarrhoea patients in children population in a large diarrhoea treatment centre.

12. Study the impact and sustainability of income generation project with nutrition and health education in low socio-economic families.

A) Present Activity

Service: Administrative relating to quality of care for Medical Unit I of CRSC
Consultancy to patients and clinical fellows of hospital
Training of the clinical and research fellows

Scientific: Research in related field of nutrition and diarrhoea
Nutrion working group member

(1) Development of Projects with new technology such as stable isotope of zinc.

(2) Writing up manuscripts for publication in International Journals (Number 10- 12).

(3) Developing collaborative project with University of London & University of Dhaka, JHU.

(4) Analysis of data from completed research projects

(5) Advisory work to Health & Nutrition activity of GoB, NGOs, Donors, National Institutes.

(6) Periodical work in editorial committees of two Journals

(7) Periodical teaching in Nutrition Curriculum of University of Dhaka (HEC,BICH).

(8) Guiding M.Phil & Ph. D students in Nutrition of University of Dhaka.

Training:

(9) ENHR, BIRPERHT
(10) Train Junior colleagues in clinical and research techniques and assist for higher education.

Referee:

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Memorandum

3 November 1999

To : Dr. S. K. Roy
Clinical Sciences Division

From : Professor Mahmudur Rahman
Chairman, Ethical Review Committee

From : Protocol # 99-022

This has reference to your memo of 3rd November 1999 attaching a modified copy of your protocol # 99-022 entitled "Clinical trial of zinc in cholera patients". I am pleased to inform you that the protocol is hereby approved upon your appropriate addressing of the issues raised by the Committee in its meeting held on 6th October 1999.

Thanking you and wishing you success in running the said study.

copy: -Division Director
Clinical Sciences Division