Attachment 1. 90

Date _____

ETHICAL REVIEW COMMITTEE, ICDDR,B.

Principal Investigator Dr. Saleha Husain Trainee Investigator (if any) _____

Application No. 83-001 (P) Supporting Agency (if Non-ICDDR,B) _____

Title of Study Level of Trace Elements (Zinc, Copper, Manganese) in children of different nutritional status in Bangladesh

Project status:
( ) New Study
( ) Continuation with change
( ) No change (do not fill out rest of 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) Minors or persons under guardianship (Yes) No
2. Does the study involve:
   (a) Physical risks to the subjects Yes (No)
   (b) Social Risks 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, birth 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 study (Yes) No
   (b) Procedures to be followed including alternatives used (Yes) No
   (c) Physical risks 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 parent or guardian (if subjects are minors) (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 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. Examples 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 Ctttee. 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.

Saleha Husain
Principal Investigator

_____
Trainee

83-001(P)
9/1/83

SECTION 1 - RESEARCH PROTOCOL

1. Title: Level of trace elements (Zinc, Copper, Manganese) in children of different nutritional status in Bangladesh.

2. Principal Investigator: Dr. Saleha Husain

   Co-Investigators: Dr. A. N. Alam
   Mr. Akbar Ali

   Consultants: Dr. Sultana Khanam
   Dr. M. M. Rahaman
   Dr. M. A. Hai

3. Starting Date: February 1983

4. Completion Date: April 1983

5. Total Direct Cost: US $ 1547.60

6. Scientific Programme Head:

This protocol has been approved by the Nutrition Working Group.

Signature of Scientific Program Head: [signature]

Date: 9/1/1983

Reviews:

a) Research Review Committee _____

b) Ethical Review Committee _____

c)

d)

e)

ABSTRACT SUMMARY

Level of trace elements (Zinc, Copper, Manganese) will be determined in seventy-five (75) children admitted into Children Nutrition Unit (CNU), Maghbazar, Dhaka, with different degrees of malnutrition, on admission and after recovery (3 to 4 weeks after admission).

These results will be compared with the serum levels of these trace elements, obtained from fifty (50) apparently healthy Bangladeshi children.

Various workers from different parts of the world have studied the levels of these micro-nutrients in normal healthy children, and in children with protein - energy malnutrition (PEM).

However, in Bangladesh, only very recently in 1981, the Nutrition programme Group of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) studied the serum zinc level of normal, Bangladeshi subjects and patients with diarrhoea. Serum zinc levels of these patients were significantly lower than levels found in normal volunteers (personal communication).

The objective of the proposed study is to estimate the trace element status in respect of zinc, copper and manganese (Zn., Cu., and Mn.) in malnourished children, both during illness and after recovery. These results will be compared with the normal control values obtained from apparently healthy children. This study would reveal the effect of a highly nutritious, rehabilitation regimen, as followed by the CNU on the levels of these trace elements, at the time of recovery.

The present study, when completed may also make data available for supplementation of these trace elements, in children recovering from different grades of malnutrition.

SECTION - II - RESEARCH PLAN

A. INTRODUCTION

1. Objective

The objectives of the proposed study will be to estimate the level of circulatory trace elements (Zinc, Copper, Manganese) in Bangladeshi children of different nutritional status.

2. Background

Twenty-six (26) of the ninety (90) naturally occuring elements are known to be essential for life. These consist of eleven (11) major elements, namely, carbon, hydrogen, oxygen, nitrogen, sulfur, calcium, phosphorus, potassium, sodium, chlorine, and magnesium and fifteen(15) elements generally accepted as trace elements. These are iron, zinc, copper, manganese, nickel, cobalt, molybdenum, selenium, chromium, iodine, fluorine, tin, silicon, vanadium and arsenic (1).

Trace elements are distinguished from the major elements by the fact that they occur in relatively small amounts or low concentrations, less than 0.01% of the weight of the human body, (2).

Although collectively referred to as trace elements, they form a heterogenous group of essential nutrients that defy any logical classification (3).

ZINC

Although the importance of zinc for the normal growth and development of plants has been known for more than a century, an understanding of its wider significance in nature is much more recent.

Knowledge of the significant role of zinc for the living organism began in 1869 when Raulin, a student of Pasteur, found it to be necessarry for the growth of the black mould, Aspergillus niger, (4).

It was in 1934 that Todd et al demonstrated the essentiality of the nutrient zinc in a mammalian species, the rat (5).

This revelation stimulated the development of theories, on the role of zinc in biochemical functions, in a wide variety of other animal species, including man.

Six years later, Keilin and Mann discovered carbonic anhydrase, a zinc containing enzyme that catalyzes the formation of carbonic acid from water and carbon-dioxide (5).

It has since been demonstrated that zinc is an integral constituent of, or cofactor for, as many as hundred (100) metalloenzymes. Zinc metalloenzymes are known to be present throughout all phyla and to participate in a wide variety of metabolic processes including carbohydrate, lipid, protein and nucleic acid synthesis or degradation. Each of the six (6) categories of enzymes designated by the International Union of Biochemists (IUB) Commission on Enzyme Nomenclature contains at least one example of a zinc metalloenzyme (6). The metal is present at the active site in several dehydrogenases, aldolases, peptidases and phosphatases and participates in the actual catalytic process (7).

Pancreatic carboxypeptidase A was discovered by Vallee and Neurath in 1954 - a zinc containing enzyme which converts dietary protein into free amino acids.
Zinc has also been identified in DNA polymerase, RNA polymerase, thymidine kinase and reverse transcriptase - these are enzymes that have a central role in nucleic acid matabolism (8).

Zinc and Vit A are linked through the enzyme retinol alcohol dehydrogenase, essential for the oxidation of retinaldehyde, the Vit A aldehyde. The continual formation of the visual pigment is of utmost importance in the prevention of night blindness (6).

Other zinc metalloenzymes are alkaline phosphatase, aldolase, glyceraldehyde phosphate dehydrogenase, phosphoglucomutase, phospholipase C, pyruvate carboxylase, superoxide dismutase and many more (7).

ZINC METABOLISM IN HUMANS

Human body contains between one and two grams of zinc. The daily requirement in adults is between 15 and 20 mg.

Higher levels are recommended during pregnancy and lactation and for infants and children (6). Meat and fish are the best sources and vegetarian diets have a low content of zinc (9).

Absorption of zinc is complex and is hampered by high dietary intake of phytate and fibre.

The amount of zinc transported to the serosal surface of the mucosal cell for uptake into the plasma is regulated by binding to specific intracellular ligands (10).

In blood, 80% of zinc is bound to erythrocytes, 16% is present in plasma and the rest in leucocytes (6).

Approximately 50% of plasma zinc is freely exchangeable and loosely bound to albumin 7% is bound to amino-acids and the rest is bound to macroglobulins and other serum proteins (4). The normal plasma level of zinc is 12-20 mmol/litre. The zinc content of red cell is 10-14 mg/ml and shows little variation in deficiency states. Plasma zinc is dynamic and in states of stress may fall below 5 mmol/ litre due to internal shifts, mainly into the liver. Such alteration is mediated by a hormone - like substance termed leucocyte endogenous mediator (LEM). It is liberated from polymorphonuclear leucocytes during tissue damage.

The normal serum level of zinc is 80 - 146 mg/100 ml the mean value being 114 mg/100 ml (11). Under normal circumstances, urinary excretion is less than 10 mmol/day, which increases 2-4 fold in response to injury (6).

ZINC DEFICIENCY

In young pigs given a zinc - deficient diet, the growth rate declined. This was observed by Miller et al. Similarly, rats fed a zinc deficient casein diet had significantly lower weight gains than zinc supplemented control rats (12).

The first syndrome of zinc deficiency of pediatric importance was described in 1963 when Prasad et al reported human zinc deficiency (the mean plasma zinc concentration in these children was 67 ± 11 mg/dl as compared to controls, 102 ± 13 mg/dl) with clinical manifestations (poor growth, hypogonadism, and anaemia) (13). Studies by Kay et al during zinc-free total parenteral nutrition (TPN) in man, showed that a declining plasma zinc level was associated with an acute zinc deficiency syndrome manifested by diarrhoea. The condition showed an effective response to zinc therapy (14).

The Denver study by Hambidge et al in 1972 reported symptomatic zinc deficiency with poor growth, amorexia and impaired taste acuity (hypogeusia) in a number of otherwise normal children who had no recent or chronic illness. This study was a classic example of how an affluent community did not achieve the recommended level of dietary intake of zinc (15).

Excessive studies by Henkin et al demonstrated that both hypogeusia and hyposmia have also been associated with zinc deficiency. The effect of zinc on taste perception is mediated through a salivary zinc protein, gustin (16)..

In India, Kutumbale et al documented reduced levels of circulating zinc in nutritional marasmus and oedematous forms of protein-energy malnutrition. They found statistically significant low levels of zinc in serum and erythrocytes (16). Kumar, S., et al also found low plasma and erythrocyte zinc levels in protein - calorie malnutrition (17).

Similar

observations were made by Goel, R., et al (18)
Studies carried out in Egypt by Khalil, M., et al estimated low plasma and red cell zinc in kwashiorkor and marasmic infants (19).

Golden, M.H.N. et al also found mean plasma zinc value significantly lower in marasmic, marasmic kwaskiorkor and kwashiorkor children in Jamaica than that of the control group (20). They also evidenced in another study, that the thymic atrophy and defects of cell - mediated immunity seen in infants with low plasma zinc levels, who are recovering from PCM can be reversed by therapy with zinc (21).

Zain, B.K., et al found low serum zinc levels in uncomplicated cases of kwashiorkor and no change in any other types of protein - calorie malnutrition (22).

As cited by Golden, B.E., et al Sandstead has suggested that zinc deficiency played a role in the development of PEM (20).

Patients with decreased serum zinc levels have demonstrated accelerated wound healing with supplemental zinc therapy (23).

Acrodermatitis enteropathica is an autosomal, recessive inherited, potentially fatal disorder due to zinc deficiency, resulting from malabsorption which show dramatic recovery with zinc therapy. Moynahan in 1974 recognized the crucial role of zinc in this disorder (6).

COPPER

The requirement of copper for the prevention of anemia was recognised by Hart et al in 1928 (2). Six years later, Cohen and Elvehjem showed that copper is essential for the elaboration of heme A, a component of cytochrome oxidase and thus copper was established as a biochemically significant catalyst (24). This cuproprotein catalyzes the final and irreversible step in the mitochondria electron transport chain and is therefore of key importance in energy production for protein biosynthesis. Ceruloplasmin, another cuproprotein is an alpha - 2 - globulin formed in the liver. It is essential

for the oxidation of ferrous (Fc^{2+}) to ferric (Fc^{3+}) in which form iron is bound to transferrin, the transport protein which supplies iron to the bone marrow cells. Tyrosinase catalyzes the first two steps in the synthesis of melanin and genetically determined absence of this enzyme results in albinism. Other cuproenzymes are superoxide dismutase, monoaminc oxidase and dopamine B hydroxylase (6).

COPPER METABOLISM IN HUMANS

The total body content of copper in the adult is approximately 80 mg (25). The average daily diet contains 2-5 mg of Cu. This micronutrient is aboundant in shell fish, legumes, dried vegetables and cocoa (26).

In adults, about 49% of the copper in whole blood is in the RBCS, where the concentration is about 10 mg/dl of R.B.Cs. 60% of the RBC Copper is present in the enzyme superoxide dismutase and this fraction remains constant. The remaining 40% of RBC copper is in a labile pool in equilibrium with plasma copper. In plasma, about 96% of the copper is present as ceruloplasmin. Majority of the remaining copper is bound to serum albumin (2). The normal plasma copper is 13.22 mmol/L (6). Plasma copper levels are higher in women than in men and rises during pregnancy. Copper is thought to be absorbed complexed with amino acids by an active process. In the mucosal cell copper is associated with metallothionein. Copper is transported in the blood to the liver were ceruloplasmin synthesis takes place.
The principal route of excretion of copper from the body is in the bile, where copper is found complexed to proteins and low molecular weight ligands (2).

COPPER DEFICIENCY

Until recently, the concept of copper deficiency in man was not widely accepted. Graham, G.C., et al diagnosed copper deficiency in premature and malnourished infants as late as in 1969. They

demonstrated hypocupremia, neutropenia, low ceruloplasmin level in the blood and anemia which was typically resistant to therapy with iron (27).

Similar observations were made by others in pre-term infants (28), (29). Gopalan, C., et al in a study found normal levels of plasma copper in Indian children with marasmus and much lowered levels in patients with Kwashiorkor (30).

Goel, R., et al in a similar study found a reduced plasma copper level in all the cases of severe PEM with the mean levels being same in marasmus and marasmic kwashiorkor (31).

Zain, B.K., et al analyzed the serum forcopper in 396 Pakistani children suffering form PEM. They stated that when the values found in the uncomplicated cases were compared with the normal, there was a significant decrease in serum copper in kwashiorkor and marasmus, and the level in kwashiorkor was significantly less than that in marasmus (32).

Khalil, M., et al carried out a study in Egypt on 20 infants suffering from kwashiorkor, 25 infants suffering from marasmus together with a normal control group of 25 well-nourished infants and found significantly lower plasma and erythrocyte copper than in the controls. Sandstead and his associates reported substantially reduced serum copper values in kwashiorkor and attributed them to a reduction in plasma proteins (19).

Conditioned hypocupremia has been reported in protein - energy malnutrition by Lehman, B.H., and his associates and quoted by Solomons, N.W., in a review of copper nutrition in man (33).

MANGANESE

Manganese (Mn) is a component of comparatively few metalloenzymes; these include pyruvate carboxylase, catalyzing the conversion of pyruvate to oxalo-acetate and superioxide dismutase. Manganese

activates enzymes like glycosyltrans-ferases that are involved in the synthesis of polysaccharides and glycoproteins (eg. prothrombin) (2).

MANGANESE METABOLISM IN HUMANS

The body of a normal, adult man is estimated to contain a total of 12-20 mg Mn. The concentration of this micronutrient is higher in tissues rich in mitochondria (1).

Manganese is absorbed throughout the length of the small intestine by a two-step mechanism involving initial uptake from the human and then transfer across the mucosal cells to the body. The two Kinetic processes operate simultaneously, with Manganese competing with iron and cobalt for common binding sites in both the processes. (1). The serum concentration of manganese is 1.42 ± 0.2 mg/L and the level in red cells is 23.57 ± 1.2 mg/L (1). In human serum, manganese is bound to a specific B globulin. Nuts and whole grains are rich sources of manganese. Meat and fish are poor sources (34).

MANGANESE DEFICIENCY

The features of manganese deficiency, namely, impaired growth, skeletal abnormalities, depressed reproductive function and ataxia of the new born have been observed in animals. Mn deficiency in pregnant rats induces profound ataxia in the newborn (2).

Very little is known about manganese deficiency in man.

The only reported case in man exhibited a mild dermatitis, slight reddening of hair and depressed vitamin K - dependent clotting factors that did not respond to therapy with vitamin K (2).

MALNUTRITION AND ASSOCIATED TRACE ELEMENT DEFICIENCIES

Malnutrition is a major health problem in developing countries and a serious obstacle to the socio-economic development of a nation.

Protein - energy malnutrition (PEM) describes a range of clinical disorders. At one end marasmus is due to a continued restriction of both dietary energy and protein as well as other nutrients.

At the other end of the spectrum is kwashiorkor due to a quantitative and qualitative deficiency of protein but in which energy intake may be adequate. These two syndromes are extremes.

Between them are the marasmic kwashiorkor group.

PEM is largely responsible for the fact that in many areas upto half the children born do not survive to the age of 5 years (35).

PEM is more acute in infants, children and women (36).

Death rates in these children may be 20-50 times the rate in communities of advanced countries (35)

In Bangladesh a large percentage of the population is suffering from PEM. In a nutrition survey carried out in Bangladesh it was revealed that 80% of 0-5 year old children were found to be malnourished. 58% of them suffered from chronic malnutrition and were stunted, meaning that their height was below the expected height for their age (37).

The biological importance of trace metals in human nutrition and health has been appreciated only in the recent past. The daily requirement of these elements is in microquantities and is usually met by the normal, daily diet taken by an individual.

In malnourished subjects, diet is usually inadequate in various nutrients, which may also include trace elements. Moreover, PEM predisposes to various types of infection and diarrhoea which may lead to malabsorption and further reduction of these trace elements.

3. RATIONALE

Ignorance, poverty, protein-poor diet - all may play contributory roles in the development of malnutrition and associated trace

element deficiency. Malnutrition occurs characteristically in children below 10 years, whenever the diet is poor in protein, energy and other essential nutrients (36).

Millions of children are suffering from PEM in Bangladesh (38).

The proposed study will provide information on the serum levels of trace elements in respect of zinc, copper and manganese in both malnourished Bangladeshi children and healthy controls.

The study, when completed, will enable us to plan future supplementation of these trace elements in malnourished children either hospitalised or on community basis. The proposed study would also open new avenues for further research in this field in Bangladesh.

C. METHODS OF PROCEDURE

1. Subject

In the proposed study seventy-five (75) children between the age group of 2-10 years, suffering from PEM, without any other systemic disorder or significant infection will be recruited from the children's Nutrition Unit, Maghbazar, Dhaka. The cases will be classified according to McLaren's classification into marasmus, marasmic-kwashiorkor and kwashiorkor, following a simple scoring system as followed at the CNU. (Table attached).

As much as possible age - matched, 50 apparently healthy, control subjects, will be selected from the Surgical Units of the Institute of Post-Graduate Medicine and Research (IPGM&R) and Dhaka Medical College (DMC), Dhaka.

Criteria for selection of the control group - apparently healthy subjects without any systemic disorder, who will be more than 80% of weight/height in the median Harvard standard.

2. Clinical Procedure

On admission, a detailed history about the present or past illnesses with the types of food they had been eating will be obtained from parents/guardians. In addition to routine clinical and biochemical examinations, anthropometric measurements will be carried out to ascertain the nutritional status. Anthropometric measurements will include weight, height, weight for age, weight for height and mid-arm circumference.

3. Study Design

Three days' after admission, 1.5 ml of venous blood will be collected with disposable plastic syringes and needles in the morning either in the fasting state or 4 hours after the last feed. Blood will then be transferred to polystyrene tubes.

The serum levels of zinc, copper and manganese will be determined using a Perkin-Elmer 303 atomic absorption spectrophotometer (11).

The unit of measurement will be in mmol/L.

The means and standard deviations will be calculated for each group.

The mean serum levels of zinc, copper and manganese in children of different nutritional status will be compared by t tests and analysis of varience techniques. Repeat estimations will be carried out in these cases after keeping them on a high nutritious diet for about 3-4 weeks - the usual time for recovery, as per CNU's estimate. In case of marasmus 150 mls of dried skimmed milk (DSM)/kg of body weight/day is given initially working upto 250-300 mls/kg of body weight/day as improvement takes place.

In kwashiorkor and marasmic - kwashiorkor it is restricted to 100 mls of dried skimmed milk/kg of body wt/day (39).

In CNU, no supplementation of trace elements (Zinc, Copper, Manganese, is given but potassium, magnesium and Lugols iodine is given as routine supplementary treatment.

D. Significance

Useful information may be obtained in detecting the aetiology of protein - energy malnutrition from levels of trace elements studied. The correlation between malnutrition and low levels of zinc, copper and manganese will sought for in the present study. Usefulness of supplementing these micro-nutrients in the diet, as a therapeutic measure can be ascertained from this study. When completed, this will greatly influence the overall management of children suffering from malnutrition.

E. Facilities Required

Patients will be recruited from CNU and IPGMR Bio-chemical Laboratory facilities available at ICDDR,B will be utilized for the estimations of the trace elements.

F. Collaborative Arrangements

The proposed study will be conducted by Dr. Saleha Husain of IPGM&R in collaboration with the ICDDR,B.

SCORING SYSTEM FOR PEM (AFTER MCLAREN)

	Signs Present	Points
Wt/Ht	- 80% with Oedema	5
Wt/Ht	- 70% - 80 % with Oedema	4
Wt/Ht	- Below 70 % with Oedema +	3
Wt/Ht	- 70 - 80% without Oedema	2
Wt/Ht	- Below 70% without Oedema	1
Oedema	+ Dermatosis (Wt/Ht not counted)	6
Hepatomegaly		1
Hair changes		1
Dermatosis		2

TOTAL PROTEIN

Less than	3.25	7
	3.25	6
	4.00 - 4.74	5
	4.75 - 5.49	4
	5.50 - 6.24	3
	6.25 - 6.99	2
	7.00 - 7.74	1

SCORE = Sum of Points

0 - 3 = Marasmus (67.5% or Less)
4 - 8 = Marasmic Kwashiorkor
9 -15 = Kwashiorkor

Table 1: Serum Copper, Zinc and Manganese Levels (ug/dk) in Different grades of PEM and Healthy Children.

	No. of cases	Copper Mean ± SE*	P.Value	Zinc Mean ± SE*	P.Value	Manganese Mean ± SE*	P.Value
I. Control							
II. PEM Grade I							
PEM Grade II							
PEM Grade III							

* As compared to control.

Table 2: Serum Copper, Zinc and Manganese Level (ug/dl) in PEM With Associated Conditions.

PEM Cases	No. of cases	Copper Mean ± SE	Zinc Mean ± SE	Manganese Mean ± SE
With Oedema				
(a) copper				
(c) zinc				
(e) Manganese				
Without Oedema				
(b) copper				
(d) zinc				
(f) Manganese				
With Diarrhoea				
(a) copper				
(c) zinc				
(e) Manganese				
Without Diarrhoea				
(b) copper				
(d) zinc				
(f) Manganese				

Compare a vs b, c vs d, and e vs f.

Table 3: Serum Copper, Zinc and Manganese Level in PEM With and Without Skin Lesions

Clinical picture	No. of cases	Copper	Zinc	Manganese
Marasmus				
Marasmic Kwashiorkor without skin lesions				
Marasmic Kwashiorkor with skin lesions				

Table 4: Serum Copper, Manganese and Zinc Level in PEM Before and After Treatment

	Copper			
	# cases	On admission	After treatment	Percent change
PEM Grade 1				
PEM Grade 2				
PEM Grade 3				

	Zinc			
	# cases	On admission	After treatment	Percent change
PEM Grade 1				
PEM Grade 2				
PEM Grade 3				

	Manganese			
	# cases	On admission	After treatment	Percent change
PEM Grade 1				
PEM Grade 2				
PEM Grade 3				

R E F E R E N C E

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SECTION III. A. Detailed Budget

1. Personnel

Name	Position	% effort	P.R. Tk.	P.R. Dollar
Dr. Saleha Hussain	P.I.	100%	-	-
Dr. A. N. Alam	Co-Invt.	5%	2480	103
Akbar Ali	Co-Invest	10%	2720	113
Dr. Sultana Khanam, Dr. M. M. Rahman, Prof. M. A. Hai	Consultants	10%	-	-
	"	5%	-	-
				216

2. Supplies & Materials	Number	Unit cost	Total cost US$
1. Disposable syringes(2.5m)	200	9.90	19.8
2. Hypodermic needle (#21)	200	3.90	7.8
3. Laboratory Lists			
a) Serum zinc	200	2.30	460.0
b) Serum copper	200	2.30	460.0
c) Serum Manganese	200	2.30	460.0
		Sub total	1,407.60

3.	Equipment	Nil
4.	Hospital cost	Nil
5.	Out patient care	Nil
6.	ICDDR,B transport	Nil
7.	Rent, communication & utilities	Nil
8.	Printing reproduction	Nil
9.	Travel & Transport of persons	Nil

10.	Transportation of Things	Nil
11.	Other contractual Services	Nil
12.	Construction, Renovation & Alterations	
	Total	$ 1407.60

B. Summary budget

		Dollar
1.	Personnel	216.00
2.	Supplies & materials	1407.60
3.	Equipment	Nil
4.	Hospital cost	Nil
5.	Out patients care	Nil
6.	ICDDR,B transport	Nil
7.	Rent, Communication & utilities	Nil
8.	Printing reproduction	Nil
9.	Travel & Transport of persons	Nil
10.	Transportation of Things	Nil
11.	Other contractual services	Nil
12.	Construction, Renovation & Alterations	Nil
		1623.60
	Total incremental cost excluding personnel.	1407.60
	10% overhead cost	140.00
	Grand total	1547.60

(1 US$ = Tk. 24)
Incremental cost

ABSTRACT SUMMARY FOR ERC

1. Seventy-five Bangladeshi children, both male and female between 2-10 yrs. of age suffering from PEM without any other systemic disorder or significant infection will be recruited from Children's Nutrition Unit (CNU), Maghbazar, Dhaka.

   Another 50 age matched healthy children recruited from the surgical units of Dhaka Medical College Hospital and IPGM&R, Dhaka will serve as control.

2. There is no potential risk involved in the study.

3. Not Applicable.

4. All records will be kept strictly confidential. They will remain with the Principal Investigator. If data is put on computer tapes, study patients will referred to by number only.

5. Informed consent (signed or thumb impression) will be obtained from all the guardians of the patients. There is no procedure in this study which may unmask the privacy of the subject.

6. Interview will be taken only related to the history of illness and is needed only for clinical management of the disease. 5 minutes will be enough to take such a clinical history.

7. The child will gain through treatment of his illness. Society will gain if the findings of the study enable us to plan future supplementation of these trace elements in malnourished children on community basis.

8. The study will require examination of blood only.

CONSENT FORM

The ICDDR,B is carrying out research on the relation between diarrhoea and malnutrition. Diarrhoea play contributory roles in the development of malnutrition and associated trace element deficiency. In this study, we want to see whether certain trace elements e.g., zinc, copper, manganese decrease in malnourished children or not. We like your children to participate in the study for the well being of the society.

If you decide to participate in our study you can expect that

1) your child will be given best possible care in the hospital;
2) your child will have to stay at least 4 weeks or even more till the condition of the patient improves;
3) while your child is in hospital, we will take 1.5 cc of venous blood on two occasions only. The first one 1 week after admission and the 2nd one 4 weeks after. This will be necessary to know the condition of the blood;
4. if you do not like to participate in the study, you will continue to receive care as usual;
5. besides, if you wish you are at liberty to withdraw from the study at any time without any obligations and jeoperdizing your medical care.

If you are voluntarily willing to participate in the study, then please sign your name or give left thumb impression below.

Signature of Investigator with Date.

Signature and Left Thumb Impression of Legal Guardian.

আন্তর্জাতিক উদরাময় গবেষণা কেন্দ্র

সম্মতি-পত্র

আন্তর্জাতিক উদরাময় গবেষণাকেন্দ্র পাতলা পায়খানা এবং পুষ্টিহীনতার মধ্যেকার সম্পর্ক নিয়ে বিভিন্ন গবেষণা করে আসছে। পাতলা পায়খানা থেকে পুষ্টিহীনতা হতে পারে এবং রক্তে কতকগুলি ধাতুর অভাব হতে পারে। আমরা গবেষণা করে দেখতে চাই পুষ্টিহীনতা অবস্থায় তামার, জিঙ্ক এবং ম্যাগনেসিয়াম ধাতুর পরিমাণ রক্তে কমে যায় কি না। আমরা মানবতার বৃহত্তর স্বার্থে আশা করব যে আপনার বাচ্চাকে আমাদের এ গবেষণায় অংশগ্রহণ করতে দেবেন।

আপনি যদি গবেষণায় অংশগ্রহণ করতে রাজী থাকেন তাহলে নিম্নলিখিত ব্যবস্থাদি নেয়া হবে——

১। আপনার বাচ্চার সর্বোত্তম চিকিৎসার ব্যবস্থা করা হবে

২। আপনার শিশুকে চার সপ্তাহ কিংবা তারও বেশী সময় সম্পূর্ণ ভাল না হওয়া পর্যন্ত থাকতে হতে পারে।

৩। হাসপাতালে থাকাকালীন সময়ে আমরা তিনবার সামান্য শিরার রক্ত (১.২ মি মি) নেব, প্রথমবার ভর্তির একসপ্তাহ পরে এবং দ্বিতীয়বার চার সপ্তাহ পরে। এটা রক্তের অবস্থা জানার জন্য প্রয়োজন হবে।

৪। আপনি যদি অংশগ্রহণ করতে রাজী নাও হন তবুও অন্যান্যদের মত চিকিৎসা পাবেন।

৫। এছাড়াও গবেষণাচলাকালীন যে কোন সময়ে

াপনি ইচ্ছা করলে আপনার সন্তানকে গবেষণা থেকে
ত্যাহার করে নিতে পারেন, এতে চিকিৎসার কোন
তি হবে না।

আপনি যদি সবকিছু বুঝে স্বেচ্ছায় এই গবেষণা
গ্রহণ করতে রাজী থাকেন তাহলে নিচে
পনার নাম/বৃদ্ধাঙ্গুলের ছাপ দিন।

বেষকের স্বাক্ষর

অভিভাবকের স্বাক্ষর/বৃদ্ধাঙ্গুলের ছা

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