



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Impact of Nutrients on Malnourished Infants and Toddlers

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Abstract: health problem, especially in children and new born. It is a broad term commonly used as an alternative to under nutrition. Malnutrition is 'the state of not having enough food, either due to scarcity of food eatables or due to consumption of even spoiled food. A state of poor nutritional status as a result of inadequate intake of nutrients,, excessive loss of nutrients, and malabsorption.

World Health Organization (WHO) defined as range of pathological conditions arising from coincidental lack in varying proportions of protein and calories, occurring most frequently in infants and even in toddlers and commonly associated with infection. Malnutrition is affecting almost half of the children the world under nutrition contributes to more than one third of all death of children under the age of five.

Index Terms - Malnutrition, nutrition of children, etiology.

I. INTRODUCTION

Malnutrition has adverse effect on the survival, health performance, activity and progress of population group in India. According to the National Family Healthy Servey_3, mild to moderate malnutrition which eventually ends up to stunted growth continues to exist in around 84% of the pediatrics population. These substandard survivors are likely to suffer from consequence such as poor quality of life, low cognitive development and learning skill over and above other handicapped. i is sample paper format only please use this format and follow this structure as per your requirement.

The health and wellbeing of any individual is based on a combination of various factors. Besides diet and good nutrition, a host of contributory factors go a long way in preventing diseases and malnutrition. These may be environmental, socio demographic, immunization programs, provision of clean water supply and even psychosocial Environmental factors include parental factors, socio economic status, living standards and child rearing practices.

Socio demographic factors includes breast feeding practices,diet during illness for mother and child, maternal malnutrition, low birth weight babies, recurrent infections, etc.

II.Classification and Anthropometry:

- 1]MacLaren classification/classification based on Wt and Ht.
- 2]Gomez classification/classification based on Wt for age.
- 3]Waterlow classification/classification based on Ht for age.
- 4] Syndromal classification/classification based on clinical features.

It is further divides;

- a)Non edematous malnutrition/marasmus.
- b)Edematous malnutrition/ kwashiorkor.
- c)Marasmic kwashiorkor showing both features.
- d)Nutritional dwarfism /stunting.
- e)Prekawshiorkor/ stunted and wasted/ invisible PEM.
- f) Specific nutritional deficiency like Iron deficiency anemia, vitamin B6 deficiency and Pellagra
- g)Underweight.

III. ETIOLOGY

Etiology of malnutrition is very complex. Basically there are 2 factors

- A] Failure to take sufficient essential nutrients i.e. dietary inadequacy.
- B] Failure to absorb essential nutrients. Dietary inadequacy;
 - a] Poverty
 - b] Ignorance and Poor quality of food.
 - c] Inadequate Breast feeding .
 - d] Inadequate early weaning.
 - e] Nutritional deficiency resulting poor appetite.

Causes:

- 1- Improper absorption in low birth weight babies .
- 2- Malabsorption due to any causes like chronic diarrhoea , helminthiasis, tuberculosis, amoebiasis, cystic fibrosis, celiac disease, ulcerative colitis etc.
- 3- Nuqse quwte tabiya, nuqse quwte ghaziya, nuqse quwte namiya wa maseka.
- 4- Nuqse hazme madi, Kabidi, uzuvvi etc.
- 5- Deficiency in natural power and nutritional power.
- 6- Mutadi amraz and muzmin amraz. (acute and chronic infections)

Other predisposing factors :

- a- Teen age marriages ,
- b- not following ante natal advices.
- c- Home deliveries.
- d- Delayed breast feeding.
- e- Top milk and artificial feeding.
- f- Early Weaning and complementary feeding.
- g- Large families and socioeconomy conditions.
- h- Improper and over cooking food.
- i- Cultural factors and urbanisation.
- j- Avoid immunization and vaccination.

IV. RESEARCH METHODOLOGY:

Gopalan in 1968 introduced a new adaptation and dysadaptation. He suggested a new adaptation and dysadaptation thesis. He was explained on biochemical and hormonal factors. The malnourished child adapts himself to the unfavourable circumstances to the calorie and protein gap. They reduce their activity their growth there by bringing down the basal metabolic rate thus save energy for survival. This reduction in BMR and lack of insulating fat leads to hypothermia which may prove fatal.

The basic adaptation to explain the mechanism was the gradual wasting of muscle and subcutaneous fat would also protect certain other metabolic processes like the amino acids are made available which it was assumed would enable the liver to maintain the synthesis of components/protein , essential for homeostasis like serum albumin and beta lipoprotein. This could explain the absence of oedema or fatty liver in Marasmus. The high level of catabolic hormones including cortisol causes muscles and fat breakdown. The anabolic hormones like insulin and growth factors maintain near normal anabolism to prevent oedema and fatty liver by enabling the synthesis of albumin and beta lipoproteins from the available pool of amino acids.

Golden's theory/ Radical theory:

Another theory postulated in the pathogenesis of PEM. Radical theory that some of free radicals which are assumed to play a role in oedema, skin changes, fatty liver and spleen. The free oxygen radicals which are toxic to cell membranes are produced during infections. In the malnourished child deficiency of micro nutrients like Vitamin A, C, E and selenium . Which are antioxidants can result in the accumulation of toxic free oxygen radicals. These further damage the liver cells resulting in kawashiorkor.

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V. PROPERTIES AND SYMPTOMS

Clinical features of mild malnutrition; Most common between the age of 9 months to 2 yr.

Decrease weight, decrease mid arm circumference, delayed bone maturation, Diminished Weight for height and diminished skin fold thickness. A high rate of infections involving various organs and systems e.g. TB.

5.1 CLINICAL FEATURES of PEM:

- a) Marasmus: Most common age of 6 months to one year of life. Gross wasting of muscle, poor muscle tone, complete loss of subcutaneous fat, prominent bones, apparently large head with staring eyes. Shrunken buttocks and baggy paint appearance. Face prematurely aged look, monkey faces, skin dry and wrinkled, patchy, hypo pigmented. Hair dry lighter than normal. Weight loss, GIT disturbances like constipation, diarrhoea, dehydration.
 - b) Kwashiorkor: Most common age of 1 yr to 4 yr. pitting edema usually starting on legs and feet spreading in more severity to the hands and face. Child may have a fatty sugar baby appearance. Muscle wasting present. Child is often weak, hypotonic and unable to walk and stand. Moon face or baggy cheeks. Increase skin lesions and pigmentation, dermatitis, angular stomatitis, smooth tongue. Light coloured hair, flag sign present. Unhappiness, apathy and irritability with sad intermittent cry anorexia. Severity may lead to permanent physical and mental retardation. GIT disturbances vomiting, diarrhoea and abdominal distention and hepatomegaly is present. Anemia, electrolyte imbalance, cyanosis, cold pale extremities.
- 5.2 Clinical features of marasmic kwashiorkor : Marasmic kwashiorkor represents the intermediate form of PEM, characterized by features of both. The degree of stunting is remarkably greater in this form indicating long duration of illness. Children with severe muscle and fat wasting but with presence of edema are called marasmic kwashiorkor.
- 5.3 Clinical features of prekwashiorkor /Stunted and Wasted : Refer to a child poor nutritional status. Suddenly hair changes and edema and other features of full blown kwashiorkor.
- 5.4 Clinical features of nutritional stunting/Dwarfing: If PEM starts fairly early in life and goes on and on over a number of years without causing overt picture of kwashiorkor and marasmus. Child's height as well as weight may be significantly low for his age.

5.5 Clinical features of specific nutritional deficiencies:

- 5.5.1- Iron deficiency: Fatigue, anaemia decreased cognitive function, headache, glossitis and Nail changes.
- 5.5.2 Iodine deficiency: Goiter, developmental delay, mental retardation.
- 5.5.3 Vitamin D deficiency: Poor growth, rickets and hypocalcemia.
- 5.5.4-Vitamin A deficiency: Night blindness, exophthalmia, poor growth , hair changes and renal disease.
- 5.5.5-Vitamin C deficiency: Bleeding gums, perifollicular haemorrhage, pseudopralysis.
- 5.5.6-Folate deficiency: Glossitis, anaemia.
- 5.5.7-Zinc deficiency: Anaemia, dwarfism, hepatosplenomegaly, hyperpigmentation and hypogonadism, acrodermatitis enteropathica, diminished immune response, poor wound healing.
- 5.5.8-Thiamine deficiency: Neuropathy, encephalopathy, ccf.
- 5.5.9- Niacin deficiency: Dermatitis, diarrhoea, dementia.
- 5.5.10-Vitamin B12 deficiency: Skin pigmentation, anaemia , cerebral sign.
- 5.5.11- Selenium deficiency: Cardiomyopathy, myalgia.
- 5.6 Clinical features of associated infections, and infestations: Pneumonia, otitis media, UTI, TB, diarrhoea, thrush ,herpes.

VI. ASSESSMENT AND DIAGNOSTIC

I. Assessment of nutritional status is done according to weight for height, height for age , and presence of oedema

6.1. Essential feature of marasmus: growth retardation, loss of weight, sub cutaneous fat wasting and absence of oedema.

6.2 Essential feature of kwashiorkor: growth retardation, loss of weight as well as height, muscle wasting and retention of sub cutaneous fat. Mental retardation, lack of interest and pitting bilateral oedema.

II. INVESTIGATION: Complete blood count, random blood sugar level, mantoux test, serum electrolyte, liver function test, renal function test, creatinine, serum proteins, alkaline phosphate, urine routine, serum albumin , serum calcium and chest x-ray.

VII. ADVERSE EFFECT AND COMPLICATIONS

Malnutrition has severe effect on central nervous system causing retarded brain growth, cerebral atrophy, auditory and visual abnormalities. It also affects gastro intestinal tract resulting in smooth tongue, mucosa, atrophic and shiny, small intestinal villous atrophy and rectal prolapsed.

Fatty liver. in edematous malnutrition and shrunk in marasmus on

Pancreas: Predominant involvement of exocrine pancreas, reduced insulin level, reduced glucagon production.

Endocrines: adrenals atrophic, thyroid involution, high growth hormone level.

COMPLICATION: Various complications seen in malnutrition includes

- 1] Water and electrolyte disturbances.
- 2] Hypothermia.
- 3] Hypoglycemia.
- 4] Infections and infestations.
- 5] Anaemia and vitamins deficiencies.
- 6] Lactose intolerance.
- 7] Cardiac failure.
- 8] Bleeding tendency.

VIII. PROPOSED MANAGEMENT:

The management of malnutrition depends on its severity while mild to moderate. Malnutrition can be managed on ambulatory basis, severe malnutrition is preferably managed in hospital. Mild to moderate malnutrition make up greatest portion of malnourished children. The main stay of treatment is provision of adequate amounts of protein and energy at least 150 Kcal/ kg/ day should be given. In order to achieve these high energy intakes, frequent feeding (up to 7 times a day) is often necessary. Because energy is so important and carbohydrates energy sources are bulky. A protein intake of 3 gm/kg/day is

sufficient. Milk is most frequent source of the protein and other sources including vegetable, protein mixture have been used successfully. Adequate minerals and vitamins should be provided for the appropriate duration.

The best measure of the efficacy of treatment of mild to moderate malnutrition is weight gain. Milk, Protein powder, oil, sugar and flour is used to increase the density of the feed and providing calories.

7.1 Home based management:

Domiciliary/ Home based management: Children with mild to moderate malnutrition are best managed in their own homes and kept under surveillance so as to find out improvement or deterioration in their nutritional status. The parents of such children are educated about the inadequacy in child's intake and guided how to correct it. The stress should be on the locally available economic foods including

Hyderabad mix:86 gm Hyderabad mixture providing 330 kcal and 11.3 g protein.

FORMULA NO.1:

Roasted whole wheat – 40g.

Roasted Bengal gram-16 g.

Roasted ground nut- 10g.

Jaggery - 20 g

To improve test and quality mix them Dry skimmed milk-10g Defatted soya flour-10 g. and increasing 40 kcal energy and 5.2 gm proteins .

FORMULA NO.2:

Hyderabadi Khichdi: This mixture gives 120 kcal and 1.7gm protein per 100 ml. Hyderabadi kheer is usually made in milk and water.

Rice powder -100gm

Suger-50gm

Moong Dal powder-50 gm

Olive Oil -50 ml.

Milk -100 ml

FORMULA NO. 3

Moong dal : 20 gm

Milk: 250 ml

Jagger: 20 gm

Desi ghee: 10 ml.

This gives us 116 calorie and 16 gm protein.

FORMULA NO. 4

This mixture gives nearly 600 calories and 14.7 gm. protein.

Ground Nuts -100 gm

Milk - 100 ml.

Suger /Jaggery -20 gm.

Egg: One piece (preferably non farming)

VIII. RESULT AND CONCLUSION

Sr. No	Age(Years)	Body Wiegth(Kg)	Formula 1(5 times/day) Improvement n wieht	Formula 2(5 times/day)	Formula 3(5 times/day)	Formula 4
1	0-0.5	5.4	70%	80%	100%	-
2	0.5-1	8.6	70%	100%	60%	-
3	1-3	12.2	80%	70%	-	60%
4	4-6	19.4	70%	60%	-	100%

It is observed that the children in the age group of up to three months who are exposed to breast feeding and served formula 3 respond positively and started achieving suitable proportional weight.

When children in between the age group of three to six months were served formula 3 along with breast feeding exhibit almost 90% weight gain.

When a composite plan including formula 1, formula 2 and formula 3 along with breast feeding was served for the toddlers in between six to nine months, up to 80% improvement was observed in the malnourished children.

When a composite plan including formula 1, formula 2 and formula 3 along without breast feeding was served for the toddlers in between one to three years up to 80% improvement was also observed in the malnourished children.

Early intervention and vigilance will help us diagnose the malnutrition in the infants and toddlers and treat accordingly.

ACKNOWLEDGMENT:

I am thankful to the administration of A R K Unani Medical College for providing me the necessary environment to go publishing a paper in journal.

I would like to thank Dr. Shadab Jamal who inspired me for continued learning by encouraging me to be part of either a conference or write a paper in journal of reputation would like to say words of gratitude to whomever who cooperated me during the course of writing this paper.

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