Research Article

A Study of Protein Energy Malnutrition (PEM) in Children (0 to 6 Years) In a Rural Population of Wardha District (MH)

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Abstract –

The aim of this study is to assess child malnutrition and determine the factors affecting the malnutrition pattern among the Anganwadi children in District Wardha, Maharashtra, India, by utilizing nutritional anthropometric survey figures. From 0 to 6 years old, 200 children provided us with dietary and anthropometric information. The majority of the protein-energy malnutrition patterns in children are mild to moderate in severity. The results unequivocally point to a number of socioeconomic and micro environmental variables as likely causes of low nutritional status. All of these findings point to the need for improved nutrition and medical attention for preschoolers in order to address the PEM issue.

Key words - *Nutritional Status, Malnutrition, Protein Energy Malnutrition (PEM), Preschool*

Introduction –

In underdeveloped nations, protein energy malnutrition (PEM) sometimes goes by the name protein calorie malnutrition (PCM). The combination of low earnings and inadequate access to healthcare and basic amenities increases the likelihood of malnourishment. In absolute terms, the prevalence of urban malnutrition may be very high even though it is somewhat lower than that of rural malnutrition." Finding out how widespread malnutrition is in urban slums would be crucial for this reason alone.[1] Since they are the most fragile and at-risk group, children under the age of five require specialized medical care. In this age range, about 12–15% of people on Earth reside. This age group accounts for 25–30% of deaths in poor nations.[2] In September 2014, UNICEF, WHO, and the World Bank released an updated joint dataset on child malnutrition indicators (stunting, wasting, severe wasting, overweight, and underweight) as well as new global and regional estimates for 2013 with 95% confidence intervals via an interactive dashboard. 99 million children under the age of five were underweight worldwide.[3, 4,] About one third of malnourished people resided in Africa and two thirds in Asia in 2013. Undernutrition peaks at 20 months of age, with 48% of children under five years old being stunted and 43% underweight. Over the age range, wasting usually declines. Twenty to thirty percent of infants are malnourished even in the first six months of life, when the majority of babies are breastfed. Notably, 30% of children are severely stunted and 25% are severely underweight around the age of 18–23 months, when many children are weaned off of breast milk.[5] Numerous etiological factors, including poverty, unsanitary surroundings, dietary practices, customs, and beliefs, are well-known to contribute to nutritionally deficient states, illness, and mortality. These variables differ from location to location, and the combined effect of each finally determines how well preschoolers are generally health-wise in a nation. In order to better understand protein energy malnutrition (PEM), a study was carried out on children aged 0 to 6 living in rural Maharashtra's Wardha area.

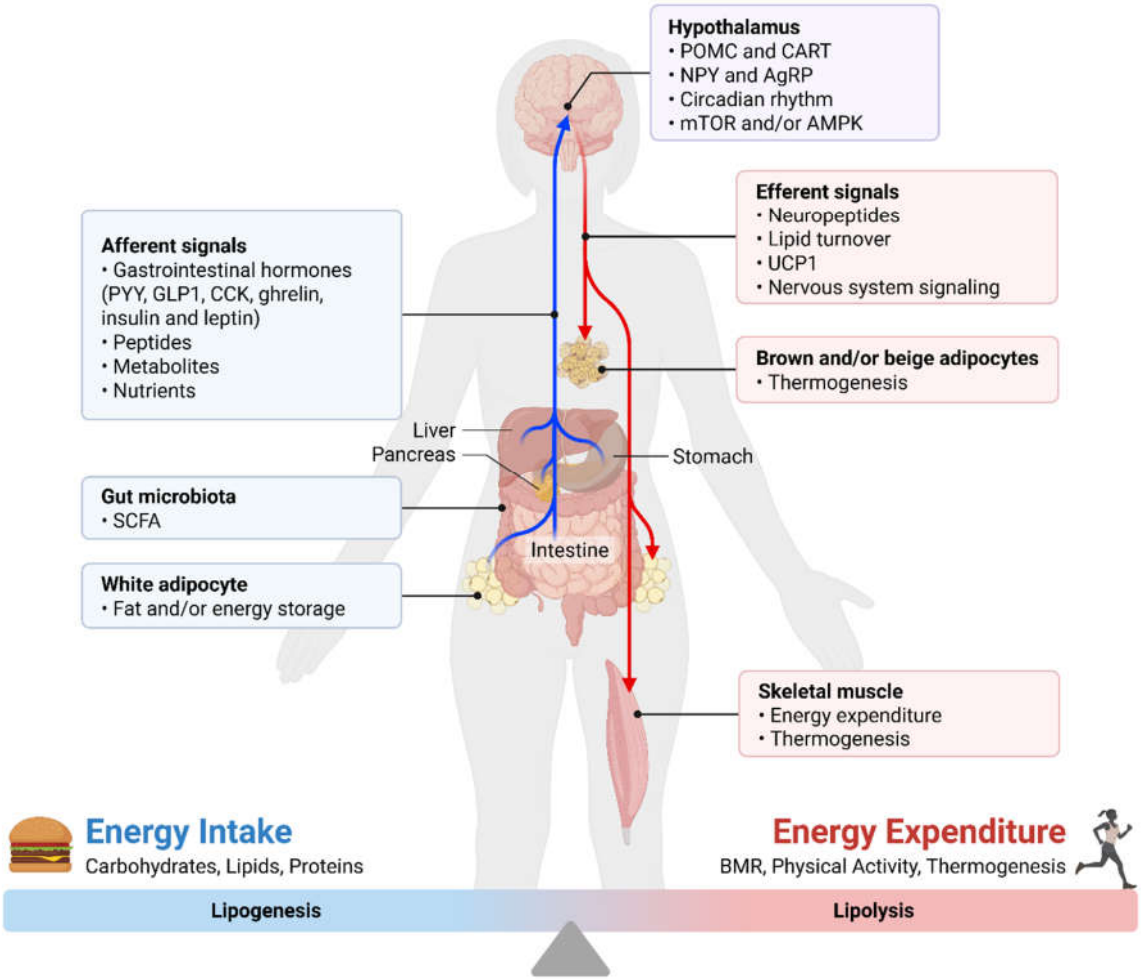

Figure 1: Key Metabolic Mechanisms on Body Weight Regulation

Protein-energy malnutrition or PEM is the condition of lack of energy due to the deficiency of all the macronutrients and many micronutrients. It can occur suddenly or gradually. It can be graded as mild, moderate or severe. In developing countries, it affects children who are not provided with calories and proteins. In developed countries, it affects the older generation.

Classification Of Protein Energy Malnutrition

PEM can be classified into two types:

- Primary PEM
- Secondary PEM

I. Primary PEM

This type of protein-energy malnutrition is found in children. It is rarely found in the elders, the main cause being depression. It can also be caused due to child or elder abuse. In children, PEM is primarily of two types:

- Kwashiorkor
- Marasmus

a. Kwashiorkor

- This occurs due to the abandonment of breastfeeding before the actual age due to the birth of a younger sibling.
- Kwashiorkor may also be the outcome of acute illness such as gastroenteritis. It is confined only to a few parts of the world such as rural regions of Africa, Pacific Islands, Caribbean. In these places, the food is low in protein and high in carbohydrates.
- It causes leakage of the cell membrane, releasing the intravascular fluid and proteins. This results in oedema.
- It weakens the immunity of a person, making him susceptible to diseases.

Extended reading: Kwashiorkor

b. Marasmus

- Weight Loss
- Fat and muscle depletion
- Most common in developing countries.
- More common than Kwashiorkor
- Prevalent in children younger than those affected by Kwashiorkor
- Cell-mediated immunity is impaired, making the children more susceptible to infections.

II. Secondary PEM

- It is caused due to disorders in the gastrointestinal tract.
- It can be caused due to infections, hyperthyroidism, trauma, burns, and other critical illnesses.
- It decreases appetite and impairs nutrient metabolism.

Symptoms of Protein Energy Malnutrition

The symptoms of protein-energy malnutrition or PEM are as follows:

- Apathy and irritability
- The patient becomes weak and inefficient.
- Impaired cognition and consciousness.
- Temporary lactose deficiency

- Diarrhoea
- Gonadal tissues atrophy
- Causes amenorrhea in women
- Causes libido in both men and women
- Weight loss
- Shrinking of muscles
- Protrusion of bones
- The skin gets thin, pale, dry, inelastic and cold
- Hair fall
- Impaired wound healing
- Risk of hip fractures and ulcers increases in elderly patients
- Heart size and cardiac output decreases in severe cases
- A decrease in respiratory rate and vital capacity
- Liver, kidney or heart failure
- Acute PEM might also prove fatal

Diagnosis of Protein Energy Malnutrition

PEM can be diagnosed by identifying the dietary history of the patient.

The measurement of height and weight, fat distribution, anthropometric measurements of lean body mass should be examined.

The Body Mass Index or BMI is calculated to measure the severity of PEM.

Laboratory tests such as measurement of serum albumin, total lymphocyte count, transferrin and response to skin antigens can help to detect the severity of Protein Energy Malnutrition.

The decreased level of hormones, lipids, fats, cholesterol, prealbumin, insulin-like growth factor, fibronectin, calcium, magnesium, and phosphate can also help to diagnose PEM.

Treatment of Protein Energy Malnutrition

Protein Energy Malnutrition can be treated in the following ways:

- Oral feeding
- Avoiding lactose

- Supportive care
- Reduction in poverty
- Improving nutritional education and public health measures
- Starvation can be treated by providing a balanced diet
- Multivitamin supplements
- Treat infections and fluid and electrolyte abnormalities, in severe cases

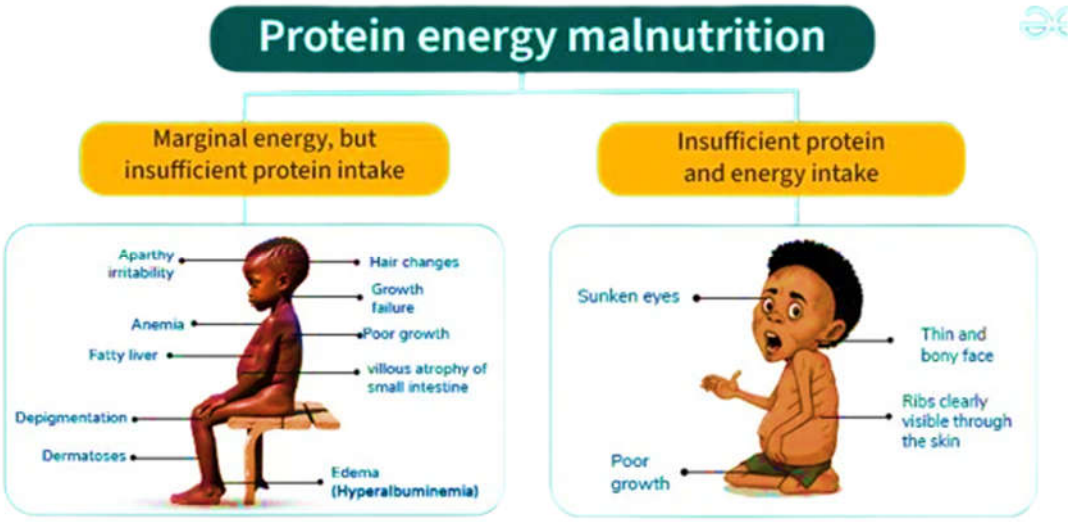

Figure 2: Protein Energy Malnutrition

Material and Method –

In the Wardha district of Maharashtra, the study was carried out across seven Anganwadi centers in the Deoli area. 200 kids participated in the study. In order to choose about 200 youngsters (0–6 years old) for the current study, a multistage sampling technique was used. Interviews with the parents yielded the required data. Anthropometric, sociodemographic, and general data were all gathered through the use of a pre-made questionnaire. The approval of the parents or family head was obtained through the preparation of a voluntary consent form in Marathi, Hindi, and English. The parent(s) or the birth certificate provided confirmation of the child's age. Weight and height were measured using an anthropometric apparatus and non-stretchable measuring tape, respectively. The measurements were taken while wearing the fewest possible garments. Utilizing a thin, flexible, and non-stretchable tape, the circumference of the head and chest were measured. Flexible, non-stretchable tape was used to measure the midpoint of the left arm precisely to determine the circumference of the mid upper arm to the closest

millimeter. Weight for age, height for age, and weight for height were among the nutritional status indices that were compared to the WHO growth charts for each age and sex. Children's growth status was assessed using three regularly used undernutrition indicators: wasting, underweight, and stunting. The acquired data was collated, input into Microsoft Excel 2007, and examined using SPSS 16.0 software for suitable statistical tests. A 95% confidence level was applied to the investigation, and $p \leq 0.05$ was deemed significant. The grading of PEM wasdone as per the recommendations of the Nutrition Sub-Committee of Paediatrics (I.C.M.R.,1972)

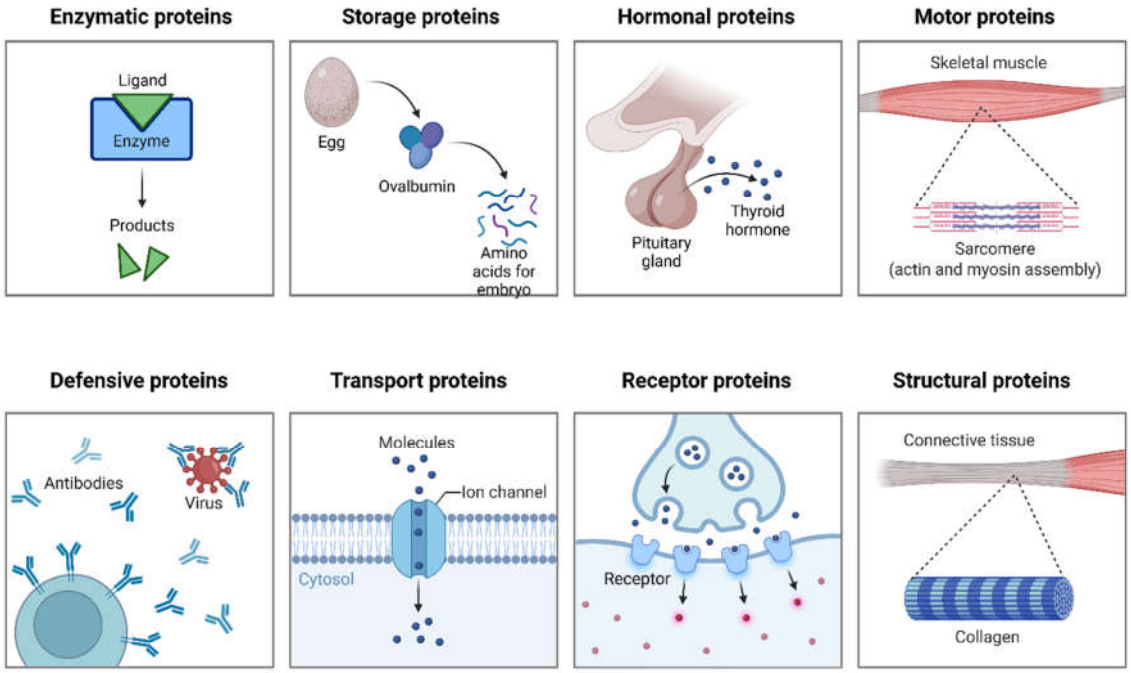

Figure 3: Overview of Protein Functions

Results and Discussion-

The prevalence of PEM in children under the age of six was reported to be 67% overall, but it was much higher (80.9%) in the group of children aged 1-3. (Table I) as compared to other age groups. This age group also exhibitedsignificantly higher prevalence (x^2=14.67, $p<0.05$) of GradeI, II, III PEM. Sen et al. also reported a higher prevalence inthe age group of 1-3 years, however Saxena et al. (1997) reported a higher prevalence in the age group of 0-1 year. Itwas found that female had an overall higher prevalence of PEM (70.6%) as also Grade I PEM (36.6%) in comparison tomales who had overall higher prevalence of PEM and GradeI PEM as 62.6 and 19.7% respectively (Table I).

Table 1: comparison to males who had overall higher prevalence of PEM and Gradel PEM

Age Group (Year) / Age wise	Total Children Studied	Normal	Grade-I	Grade-II	Malnourished Grade-III	Grade-IV	Total
0-1	42	20 (47.6%)	8 (19.0%)	8 (19.0%)	4 (9.5%)	2 (4.7%)	22 (52.3%)
1-3	84	16 (19.0%)	30 (35.7%)	28 (33.3%)	8 (9.5%)	2 (4.7%)	68 (80.9%)
3-6	74	30 (40.5%)	20 (27.0%)	15 (20.2%)	6 (8.1%)	3 (4.0%)	44 (59.4%)
Grand Total	200	66 (33.0%)	58 (29.0%)	51 (25.5%)	18 (9.0%)	7 (3.5 %)	134 (67.0%)
Sex wise							
Male	91	34 (37.3%)	18 (19.7%)	25 (27.4%)	10 (10.9%)	4 (4.3%)	57 (62.6%)
Female	109	32 (29.3%)	40 (36.6%)	26 (23.8%)	8 (7.3%)	3 (2.7%)	77 (70.6%)
Grand Total	**200**	**66 (33.0%)**	**58 (29.0%)**	**51 (25.5%)**	**18 (9.0%)**	**7 (3.5%)**	**134 (67.0%)**

Conflicting findings regarding a generally greater incidence among males were reported by Srivastava (1985) and Saxena et al. (1997). Grade II, III, and IV PEM, however, was found to be considerably greater ($x2=1.41$, $p<0.05$) in males than in females (23.8, 7.3, and 2.7%, respectively) in males (27.4, 10.9, and 4.3%, respectively).

According to Table II, children of illiterate mothers had a higher overall PEM prevalence, whereas children of mothers with only a primary education had a higher PEM prevalence in Grades II, III, and IV. The percentage of PEM in children whose mothers are illiterate or only have an elementary education was observed to differ significantly ($x2=12.53$, $p<0.05$) from that of children whose mothers have completed middle school or more. Similar findings have been reported by other researchers as well.

According to Table II, children whose fathers were laborers had the highest overall incidence of PEM (77.7%), whereas children whose fathers were trained professionals had the lowest overall prevalence (50%) of PEM. Children of laborers also included a sizable number of Grade I and Grade II PEM cases. A maximum of 29.4% of children of businessmen had Grade II PEM. The prevalence of PEM was found to differ significantly ($x2=11.04$, $p<0.05$) between children of

laborers and farmers and those who work in service, business, or specialized professions. Srivastava (1983) also noted that children from the labor class had a greater prevalence of Grade I PEM.

Table 2: Comparison of prevalence grade

Education status of mother	Total Children Studied	Normal	Grade-I	Malnourished Grade-II	Grade III	Grade-IV	Total
1lliterate	116	26 (22.4%)	37 (31.8%)	37 (31.8%)	13 (11.2%)	3 (2.5%)	90 (77.5%)
Primary	30	10 (33.3%)	6 (20.6%)	10 (33.3%)	2 (17.2%)	2 (17.2%)	20 (66.6%)
Middle School	37	20 (54%)	12 (32.4%)	2 (5.4%)	2 (5.4%)	1 (5.8%)	17 (45.9%)
Above	17	10 (58.8%)	3 (17.6%)	2 (11.7%)	1 (5.8%)	1 (5.8%)	7 (41.1%)
Grand Total	200	66 (33.0%)	58 (29.0%)	51 (25.5%)	18 (9.0%)	7 (3.5%)	134 (67.0%)
Occupation of father							
Labor	81	18 (22.2%)	29 (35.8%)	22 (27.1%)	10 (12.3%)	2 (2.4%)	63 (77.7%)
Farmer	45	14 (37.1%)	15 (33.3%)	12 (26.6%)	3 (6.6%)	1 (2.2%)	31 (68.8%)
Service	37	18 (48.6%)	7 (18.9%)	8 (21.6%)	2 (5.4%)	2 (5.4%)	19 (51.3%)
Business	17	6 (35.2%)	4 (23.5%)	5 (29.4%)	1 (5.8%)	1 (5.8%)	11 64.7%)
Skilled Professional	20	10 (50.0%)	3 (15.0%)	4 (20.0%)	2 (10.0%)	1 (5.0%)	10 (50.0%)
Grand Total	**200**	**66 (33.0%)**	**58 (29.0%)**	**51 (25.5%)**	**18 (9.0%)**	**7 (3.5%)**	**134 (67.0%)**

Conclusion –

The age group 1-3 years had the greatest rate of overall and Grade I, II, and III PEM. The percentage of cases of Grade I and total PEM among female children was greater. This could be the result of a girl child receiving insufficient care. Children with illiterate mothers had the highest prevalence of PEM (Grades I, II, and III) overall. A child's bad health is the result of inadequate education and a lack of awareness among mothers. With regards to overall and Grade I, II, and III PEM, the children of laborers were most impacted. In the labor class, it is common to observe that both parents work all day, leaving the child with very little care.

By teaching parents about the fundamental nutritional needs of their children and encouraging them to eat inexpensive, nutrient-dense foods that are readily available in their community, the amount of malnutrition can be reduced.

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