WJARR

World Journal of Advanced Research and Reviews

World Journal Series INDIA

(RESEARCH ARTICLE)

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A study to assess the prevalence and causes of protein energy malnutrition among children aged 1 to 5 years in selected urban slums at Mandsaur City, Madhya Pradesh with view to develop health information module

Mahaveer Prasad Swarkar [1, *], Malti Lodhi [2] and Amar Yadav [1]

[1] Medical Science University Jabalpur, Madhya Pradesh (MP), India.
[2] Regional Institute of Nursing Jabalpur, Madhya Pradesh (MP), India.

Abstract

An exploratory descriptive approach was adopted in the study. The sample consisted of the children aged 1 to 5 year. The study conducted at selected urban slum of Mandsaur city from 25 Nov 2021 to 31 Jan 2022. 450 children (1-5 years) included in study using convenient sampling technique and children screened for PEM by anthropometric measurement (weight, Height, Head circumference, Chest circumference, Mid arm circumference) using instrument like electronic weighing machine and inch tape then observed for clinical symptoms of PEM through using checklist and determine PEM grade of children according IAP classification of PEM, also Information were collected regarding socio demographic data and identify the cause associated with PEM in children using structured questionnaire through interview of mother and care taker.

1. Introduction

Early childhood, that is the first six years constitutes the most crucial period in life, when the foundations are laid for cognitive, social and emotional language, physical/motor development and cumulative lifelong learning. Since about 40 percent of physical growth and 80 percent of mental growth is believed to be take place during these years. These growing children require constant supplementation of calories, proteins and micronutrients to keep the pace of increased demands of the body. Since childhood is the most vulnerable phase in the life of human being, nutritional inadequacies will result in the hampering of the development of the body [1].

Childhood under nutrition is a critical public health and development challenge in many developing countries including ours. According to Census 2011 India, with 1.21 billion people is the second most populous country in the world and represents almost 17.31% of the world's population, which means one out of six people on this planet live in India. Every year, an estimated 26 millions of children are born in India which is nearly 4 million more than the population of Australia. In 2011, total number of children in the age-group 0-6 years is reported as 158.79 million in India and in Madhya Pradesh constitute (10.5 million). Malnutrition is common in India, 1in every 3 malnourished children in the world live in India. The health of our economy and society lies in the health of this generation. We cannot hope for a healthy future with a large number of malnourished children. The problem of malnutrition is a matter of national shame. Malnutrition places a heavy burden on India; malnourished children tend not to reach their potential, physically or mentally and they do worse at school than they otherwise would. It has a direct impact on productivity [2].

* Corresponding author: Mahaveer Prasad Swarkar
Medical Science University Jabalpur, Madhya Pradesh (MP), India.

The 2021 Global Hunger Index (GHI) report ranked India 101 out of 116 countries with a serious issue of child wasting. At least one in five children under the age of five years in India are wasted. According to the report, India's child wasting at 17.3% and child stunting at 34.7% [3].

Vikas Gupta et al (2019) [5] a cross-sectional study was conducted at Rohtak district among children who were 1–5 years of age. The anthropometric measurement and nutritional status categorization among children were done using the WHO guidelines. A total of 600 children participated in the study. Around 41.3% of the study participants had stunting as their nutritional status, while taking composite index of anthropometric failure (CIAF) for nutritional status into consideration, nearly 54.4% of the participants were undernourished. Stunting and underweight were more prevalent among girls.

S. K. Senthilkumar, Thomas V. Chacko, (2018) [5] A study conducted to assess the prevalence and determinants of malnutrition among children aged 0-5 at Coimbatore district. A total of 206 children aged 0-5 years were included in the study after implementing the exclusion criteria. Overall prevalence of malnutrition found to be 51%. These 51% (105) malnourished children consisted of 41.3% underweight, of which 11.2% were severely underweight. Prevalence of stunting was 32.5%, of which 6.3% were severely stunted. About 21.8% children were wasted and 6.8% were severely wasted among them. Socio-demographic factors like total number of family members exceeding four, mother's educational status, father's educational status, mother's occupational status, socio-economic status, alcohol usage by any family member, and mother's nutritional status were found to be significantly associated with malnutrition on univariate analysis.

1.1. Need of study

Protein-energy malnutrition (PEM) is a global problem. Nearly 150 million children under 5 years in the world and 70-80 million in India suffer from PEM, nearly 20 million in the world and 4 million in India suffer from severe forms of PEM

The present study done to find out prevalence of PEM in urban slum children age between the age group1 to 5 year, Malnutrition is an iceberg. Most children in developing countries live under the burden of malnutrition. Children below five years of age are vulnerable to malnutrition.

Children of today are citizens of tomorrow that is why it is extremely important to ensure proper health care facilities as well as adequate nutritional intake for the children. It is now globally acknowledged that investment in human resource development is a pre requisite for any nation. Early childhood, that is the first six years constitutes the most crucial period in life, when the foundations are laid for cognitive, social and emotional language, physical/motor development and cumulative lifelong learning. The young child under 3 years is most vulnerable to the vicious cycles of malnutrition, disease/ infection and resultant disability all of which influence the present condition of a child at micro level and the future human resource development of the nation at the macro level. The assessment of the ground reality as reflected by the statistics on nutritional status of children becomes very significant in this context. Thus the utmost importance of the findings on the nutritional and mortality status of the children can never be over emphasized.

The consequences of child malnutrition for child morbidity and mortality are enormous and there is an adverse impact of malnutrition on productivity so that a failure to combat child malnutrition reduces potential economic growth at the macro level. At the micro level, malnutrition both protein energy malnutrition and micronutrient deficiencies directly affects children's physical and cognitive growth and increases susceptibility to infection and diseases. It is obvious that there is urgent need to focus on the nutritional and overall developmental needs of children. The golden interval for intervention is believed to be from pregnancy to 2 years of age, after which under nutrition may cause irreversible damage for future development. Poor fetal growth or stunting in the first two years of life leads to irreversible damage. Inadequate cognitive or social stimulation in first two to three years has lifelong negative impact on educational performance and psycho-social functioning. (Children in India 2012- a statistical appraisal)[1].

The 2021 Global Hunger Index (GHI) report ranked India 101 out of 116 countries with a serious issue of child wasting. At least one in five children under the age of five years in India are wasted. According to the report, India's child wasting at 17.3% and child stunting at 34.7% [3].

According a report of WHO Malnourished children, particularly those with severe acute malnutrition, have a higher risk of death from common childhood illness such as diarrhoea, pneumonia, and malaria. Nutrition-related factors contribute to about 45% of deaths in children under-5 years of age. [6].

According a report of WHO Globally in 2020, 149 million children under 5 were estimated to be stunted, 45 million were estimated to be wasted and around 45% of deaths among children under 5 years of age are linked to undernutrition. These mostly occur in low- and middle-income countries. The developmental, economic, social, and medical impacts of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries [16].

According to NFHS 5, in Madhya Pradesh the number of children under 5 years who are stunted (less in India 35.7% (urban 30.1%) and the number of children who are underweight 33% (urban 28.6%) [7].

A 2019 report by the United Nations Children's Fund (UNICEF) highlighted that India reported the most number of deaths — 882,000 — of children below five years in 2018. The report titled 'State of the World's Children 2019', pointed out that malnutrition caused 69 per cent of under-five deaths in India [7].

According to UNICEF malnutrition is more common in India then in sub Saharan Africa, One in every three malnutrition children in the world live in India. Malnutrition in children is not affected by food intake alone, it is also influence by access to health services, quality of care for child and pregnant mother as well as good hygiene practices (UNICEF India)[8].

According World Bank malnutrition is India's silent emergency and among India's greatest human development challenges. Although India has strong economic growth over the past 20 years, malnutrition in children under five years of age continues to be among the highest in the world and malnutrition rate in children five times more than china(World Bank- helping India combat persistently high rates of malnutrition-) [9].

Mr. Midhun Ashok 2019 [10] - A descriptive survey was carried out at selected urban areas of Gwalior to assess the knowledge of mothers of under-five children regarding Protein-Energy Malnutrition & To identify the relationship between the knowledge of mothers of under-five children with selected Socio-demographic variables, To develop the Health education module. by a descriptive method, 150 mothers were selected by a simple random sampling technique. Data was collected using a structured interview schedule for a period of 4 weeks. Both descriptive and inferential statistics were used for data analysis. Major findings of the study the majority of the mothers (38%) were belonging to the age group of 26-30 years. Eighty-four percent of mothers were illiterates. Eighty-four percent of mothers were coolies. The majority of the mothers were House-wives (35.33%) The majority of the mothers had a monthly family income of Rs. 3001-5000/- (37.33%). Nearly half of the mothers (42%) had the family size as six and above. The mean overall knowledge score of mothers regarding Protein Energy Malnutrition was 12.91 and S.D. =3.11. Hundred and two mothers (68%) had a low knowledge score and 48 mothers (32%) had average knowledge. The X2 value showed that there was a significant relationship between the knowledge of mothers with their education and family monthly income, and hence the research hypothesis H2 and H4 were accepted. The insignificant relationship was found between the knowledge of mothers with their age, occupation, and size of the family.

Dr. Saba Syed (2016) [11] A cross-sectional study conducted on 211 children from 6 months - 6 years of age at Telangana. Data collection included socio-demographic characteristics, anthropometric measurements and assessment of infant and young child feeding practices.A total of 211 (128 females and 83 males) children were included in the study. The prevalence of underweight, stunting and wasting was observed to be 84 (39.81%), 99 (46.92%) and 47 (22.27%) respectively. Proportions of stunting and underweight was significantly more among children whose mothers reported inappropriate feeding practices as compared to their study counterparts.

A.K. Singh, et al (2012) [12] a cross-sectional study done by house to house visit covering 406 children (1-6 years) from the sub Centre villages of additional PHC Amarpur in Meerut district To study the prevalence of PEM and its various socio-demographic correlates in children. A multi-stage random sampling technique was used for selection of samples and Result show thatThe prevalence of underweight was 57.4% according to IAP classification with the proportion of grade I, II and III under nutrition being 68.2%, 29.2% and 2.6% and none of the children in grade IV under nutrition. The prevalence of underweight was significantly higher in 3-6 years children (64.1%) as compared to 1-3 years children (47.6%) and there was no significant difference in the sex and caste. Prevalence of underweight was significantly higher in children belonging to nuclear families. There was direct association of underweight in relation to poor housing and environmental sanitations and low standard of living index. The prevalence of underweight was low in children of literate mother.

the investigator observed that protein energy malnutrition is one of the 'silent emergency' seen in children of age 1-5 years of age, so Based on the field experience in the community and the literature review, the investigator felt the need to conduct the study of protein energy malnutrition among 1 to 5 year children and its associated factors. It would help

to create awareness among health professionals and people about malnutrition and the factors that leads to malnutrition in the community.

1.2. Statement of the problem

"A study to assess the Prevalence and causes of Protein Energy Malnutrition among children aged 1 to 5 years in selected urban slums at Mandsaur City, Madhya Pradesh with view to develop Health Information Module"

Objectives of the study

- To assess the prevalence of protein energy malnutrition among 1 to 5 year children in urban slums
- To explore cause of protein energy malnutrition among 1 to 5 year children in urban slums
- To find out the association between selected demographic variable and clinical variable with protein energy malnutrition
- To develop health information module on protein energy malnutrition.

1.3. Hypothesis

- H1 there is a significant association between demographic variable and protein energy malnutrition

1.4. Assumption

- Still there is prevalence of PEM in urban slums

1.5. Conceptual framework

In present study in intended to assess the prevalence of protein energy malnutrition among 1 year to 5 year children in urban slums and to find out its causes as well as associated socio-demographic variable. Modified UNICEF conceptual framework of malnutrition is used for theoretical framework (1998).

2. Research methodology

An exploratory descriptive approach was adopted in the study. The sample consisted of 450 children aged between 1 year to 5 years.

The study conducted at selected urban slum of Mandsaur City 450 children (1-5 years) included in study using convenient sampling technique and children screened for PEM by anthropometric measurement (weight, Height, Head circumference, Chest circumference, Mid arm circumference) using instrument like electronic weighing machine and inch tape then observed for clinical symptoms of PEM through using checklist and determine PEM grade of children according IAP classification of PEM, also Information were collected regarding socio demographic data and identify the cause associated with PEM in children using structured questionnaire through interview of mother and care taker.

Tool used in this study were

2.1. Section A

Screening tool for PEM

- Anthropometric measurement - weight, Height, Head circumference, Chest circumference, Mid arm circumference of child
- Nutritional status of child: -PEM grade classification (acco. IAP)-
- Clinical symptoms check list

2.2. Section B

Socio demographic data

2.3. Section C

Common causes of PEM

3. Results

3.1. Section – A

Prevalence of PEM

Ddepicted that 450 children screened for PEM and found that 282 (62.67) children were underweight. In underweight children 195 (69.14 %) children were in grade I and 84 (29.78%) children were in grade II, only 3 (1.06%) children was in grade III and no child was of grade IV PEM.

3.2. Section – B

Frequency and percentage distribution of socio demographic variables

Depicted that Prevalence of PEM was higher in children 37-48 months age group, females children, in children who had 1 year of spacing with the nearest siblings, in children who belong to nuclear family, live in 1 room house, in children of illiterate mother and father, belonging to mother's occupation labor, fathers habit alcoholism, family monthly income 2000-4000/- per month,

3.3. Section – C

Assessment of clinical symptoms of malnourished child

Depicted that most commonly occurring symptom in children with PEM was Mottled enamel of teeth 126 (44.66%), lack of luster hair was second most common symptom 117 (41.48%) and Straightness of hair 28.72%, Dispigmentation of Hair 19.14%, pale eyes 15.95%

3.4. Section – D

Frequency and percentage distribution of common causes of PEM

Depicted that prevalence of PEM increase in children with suffering from illness like diarrhea and Respiratory tract infection, partially completed immunization, breast feed not start at birth, breast feed < 2 year age, those children not exclusively breast fed, improper complementary feeds, not getting anganwadi food, feeding <3 time per day, not use green vegetable and pulses in diet, use unclean, uncovered drinking water storage and use Fire wood for cooking.

3.5. Section – E & F

Association of socio demographic variables & common causes with PEM

Depicted that that PEM in children is associated with spacing with siblings nearest in age ($X2$ value = 25.4289, $p<0.01$ in df=3), No. of rooms in house ($X2$ value = 26.191, $p<0.01$ in df=2), Mother education, Monthly income of family ($X2$ value = 37.6126, $p<0.01$ in df=3).

Diarrhea ($X2$ value = 12.1578, $p<0.01$ in df=1).), Immunization of child ($X2$ value = 43.5825, $p<0.01$ in df=3), Duration of breast feeding ($X2$ value = 23.8861, $p<0.01$ in df=3)), Exclusive breast feeding ($X2$ value = 35.7903, $p<0.01$ in df=3)), complimentary feeding start time (value = 25.6603$p<0.01$ in df=3)), No. of feeding per day ($X2$ value = 14.4587, $p<0.01$ in df=1), Drinking water storage ($X2$ value = 19.1207, $p<0.01$ in df=2).

4. Discussion

Children are valuable human assets. It is the state's responsibility to protect the rights of the children and provide equitable chance to them for development. In India, the scheme of Integrated Child Development Scheme (ICDS) is considered the single largest program to provide the basic services to children from the deprived section of society. It aims at a better start in life by providing nutrition, health education and care during illness and many other services. In India, children living in the backward and draught – urban slums and those belonging to the socially backward groups are highly susceptible to malnutrition.

4.1. Section – A

Prevalence of PEM in selected urban slum

The present study findings shows that Out of 450 children screened for PEM and found that 282 (62.67) children were underweight. In underweight children 195 (69.14 %) children were in grade I and 84 (29.78%) children were in grade II, only 3 (1.06%) children was in grade III and no child was of grade IV PEM.

According to NFHS 5, in Madhya Pradesh the number of children under 5 years who are stunted 35.7% (urban 30.1%) and the number of children who are underweight 33% (urban 28.6%) . [13]

4.2. Section – B

Frequency and percentage distribution of subjects according to socio demographic variables

- Age group wise prevalence of PEM was higher in 37-48 months age group 75 (65.69%) out of 114
- Prevalence of under nutrition was observed higher i.e. 147 (64.47%) out of 135 in femalesthan 135 (60.81%) out of 222 in males
- Prevalence of PEM is higher i.e, 66 (73.33%) out of 90in children who had 1 year of spacing with the nearest siblings
- Prevalence of PEM is higher i.e, 60 (68.97) % out of 87 in children whose family had total number of children 1.
- The prevalence of PEM in nuclear family was 201 (66.34%) out of 303 which is higher than joint family (55.1%).
- The prevalence of PEM higher i.e, 36 (80%) out of 45 in children who had total number of family member were 4 ,
- The prevalence of PEM children i.e. 168 (64.37%) out of 261 not had separate kitchen in house
- Prevalence of PEM is higher i.e. 51 (55.36%) in children who live in 1 room house.
- Prevalence PEM was higher in teen aged mother children that i.e. 15 (71.43%.) out of 21
- Prevalence of PEM is higher in children of illiterate mother and father respectively 135 (76.26%) out of 177 and 117 (73.58%) out of 159
- The prevalence of PEM is higher in children who belongs to mother's occupation labor 54 (72%) out of 75
- Prevalence of PEM higher 51 (77.27%) out of 66 in children who belongs to father in service
- The prevalence of PEM higher in children of fathers habit alcoholism i.e. 126 (72.41%) out of 174
- Prevalence f PEM is higher in children of family monthly income Rs. 2000-4000/- per month i.e. 9 (75%) out of 12 than higher income group.

4.3. Section – C

Assessment of clinical symptoms of malnourished child

Present study findings showed that most commonly occurring symptom I PEM children was Mottled enamel of teeth 126 (44.66%), lack of luster hair was second most common symptom 117 (41.48%) and Straightness of hair 28.720%, Dispigmentation of Hair 19.14%, pale eyes 15.95%

4.4. Section-D

Frequency and percentage distribution of subjects according to the cause related to PEM

- Prevalence of PEM is higher i.e. 57 (70.37%) out of 81 in children who were hospitalized twice during last year
- 87 (76.32%) out of 114 children belongs to PEM group who were suffering from diarrhea, 114 (64.41%) out of 177 children who suffering from Respiratory tract infection, whereas 33 (84.61%) out of 39 children who were suffering from other illnesses.
- Prevalence of PEM is higher 111 (80.43%) out of 138 in children whose immunization was partially completed
- 45 (68.18%) out of 66 children were not breast feed at the time of birth.
- Prevalence of PEM higher i.e 132 (75.86%) out of 174 in children who breast feed < 2 year age
- Prevalence of PEM was higher i.e. 66 (84.61%) out of 78 in children who exclusive breastfed < 6 month of age.
- All 12 (100%) Children whose complimentary feeding started at <4 month all suffering from PEM
- Prevalence of PEM was higher i.e 273 (62.76%) out of 435 in children who were not getting free food packet from anganwadi than children who getting food from anganwadi.

- Prevalence of PEM was higher 273 (62.76%) out of 435 in children who were actually not consumed anganwadi food
- Prevalence of PEM higher 168 (70.88%) out of 69 in children who were feeding <3 time per day.
- Prevalence of PEM higherin children who had not use green vegetable and pulses (legumes) in diet respectively i.e 60 (76.92%) out of 78 and 27 (75%) out of 36 children
- The prevalence of PEM was higher i.e 252 (63.16%) in children who had latrine as sanitary facility at home and all i.e 450 (100%) children had Source of drinking water from Tube well / tap.
- Prevalence of PEM higher i.e 108 (76.6%) out of 141 in children who used water from unclean, uncovered drinking water storage
- Prevalence of PEM higher i.e 48 (69.57%) in children whose family were using Fire wood for cooking than

4.5. Section – E

Association of socio demographic variables with PEM

Present study findings indicate that PEM in children aged 1-5 year is associated with spacing with siblings nearest in age (X2 value = 25.4289, p<0.01 in df=3), No. of rooms in house (X2 value = 26.191, p<0.01 in df=2), Mother education, Monthly income of family (X2 value = 37.6126, p<0.01 in df=3).

The findings are supported by study conducted by S. K. Senthilkumar, Thomas V. Chacko, (2018) [5] A study conducted to assess the prevalence and determinants of malnutrition among children aged 0-5 at Coimbatore district. A total of 206 children aged 0-5 years were included in the study after implementing the exclusion criteria. Overall prevalence of malnutrition found to be 51%. These 51% (105) malnourished children consisted of 41.3% underweight, of which 11.2% were severely underweight. Prevalence of stunting was 32.5%, of which 6.3% were severely stunted. About 21.8% children were wasted and 6.8% were severely wasted among them. Socio-demographic factors like total number of family members exceeding four, mother's educational status, father's educational status, mother's occupational status, socio-economic status, alcohol usage by any family member, and mother's nutritional status were found to be significantly associated with malnutrition on univariate analysis.

The findings are also supported by another study conducted by A.K. Singh, et al 2012 [2] a cross-sectional at Amarpur, Meerut district to study the prevalence of PEM and its various socio-demographic correlates in children. 406 children included in study and use IAP classification for nutritional status assessment. Result show that the prevalence of underweight was significantly higher in children belonging to nuclear families. There was direct association of underweight in relation to poor housing and environmental sanitations and low standard of living index. The prevalence of underweight was low in children of literate mother.

4.6. Section- F

Association of common causes of PEM with PEM

Present study findings indicate that PEM in children aged 1-5 year is associated with Diarrhea (X2 value = 12.1578, p<0.01 in df=1).), Immunization of child (X2 value = 43.5825, p<0.01 in df=3), Duration of breast feeding (X2 value = 23.8861, p<0.01 in df=3)), Exclusive breast feeding (X2 value = 35.7903, p<0.01 in df=3)), complimentary feeding start time (value = 25.6603p<0.01 in df=3)), No. of feeding per day (X2 value = 14.4587, p<0.01 in df=1), Drinking water storage (X2 value = 19.1207, p<0.01 in df=2).

5. Conclusion

The result of study described that prevalence of PEM in children aged 1-5 year that Out 450 children screened for PEM and found that 282 (62.67) children were underweight and PEM is associated with Diarrhea, Immunization of child, Duration of breast feeding, Exclusive breast feeding, complimentary feeding start time, No. of feeding per day, Drinking water storage, spacing with siblings nearest in age, No. of rooms in house, Mother education, Monthly income of family.

As an interventional measure, a health information module on PEM was prepared and distributed among care givers so that can prevent PEM among children

Compliance with ethical standards

Acknowledgments

Thank our institute for providing encouragement, supports and helping to conduct this study.

Disclosure of conflict of interest

If two or more authors have contributed in the manuscript, the conflict-of-interest statement must be inserted here.

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