Original Research Article

Study of nutritional assessment of children between 6 months to 5 years

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Abstract

Background: Nearly half of all deaths in children under 5 are attributable to under nutrition. Under nutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and contributes to delayed recovery. The WHO recommends the use of Z scores or standard deviation score (SDS) for evaluating anthropometry, so as to accurately classify individuals with indices below the extreme percentile. In India most paediatricians use IAP classification to classify malnutrition. The aim of the study is to assess the nutritional status of children between 6 months to 5 years of age attending tertiary rural hospital according to WHO criteria and to compare the result of this study with IAP classification for grading malnutrition. The objectives of the study is to assess the knowledge of mothers regarding feeding practices among these children particularly below 2 years of age and to observe associated clinical problems and state of other nutrient deficiencies.

Materials and methods: A cross sectional and observational study of 200 children admitted in pediatric ward and NRC (nutritional rehabilitation centre) of Dhiraj Hospital were taken for the study, Piparia, Waghodia, Vadodara. Study was carried for a period of 18 months from April 2015 to September 2016 to assess the nutritional status of children according to WHO criteria and to compare it with IAP classification. Assessment of the nutritional status was done by clinical examination and anthropometry. Interrogation was done with children's mothers in the language they understood regarding young children feeding practices and accordingly their knowledge was assessed. Data was compiled, categorized and analyzed by appropriate statistical method in consultation with a statistician.

Results: Total 200 patients were taken in the study. Result shows that out of 200 patients 108(54%) were males and 92(46%) were females. The distribution of patients was more in age group between 13 and 36 months with 86(43%), of which distribution of males more than females were. Distribution of patients according to SAM and MAM (WHO classification) shows 127(63.5 %) fall under SAM and73 (36.5%) fall under MAM. Distribution of patients according to SAM and MAM (WHO classification) was studied. Result shows that out of 200 children taken in the study 127(63.5 %) fall under SAM and73 (36.5%) fall under MAM according to WHO classification. Distribution of children according to IAP classification in the present study interprets that 103 (51.5%) of the total children came under grade II of IAP classification. WHO classification detected more children with malnutrition than IAP classification, which was true for both boys and girls. Comparison of MUAC (WHO) with WHO (SAM and MAM) of children taken in the present study interprets that 67 (33.5%) had SAM and 95 (47.5%) had MAM according to MUAC criteria, remaining 19% did not fall under SAM and MAM. Comparison of MUAC (SAM) with WHO (SAM) of children in present study interprets that only 67 (52.75%) children came under SAM according to MUAC criteria out of the 127 children of SAM according to WHO classification. Comparison of MUAC (WHO) and IAP classification of children in the present shows that 67 children had MUAC <11.5 cm, out of 67 children (with SAM according to MUAC criteria) 28 (41.79%) came under grade II and 21 (31.3 %) came under grade III of IAP classification. Out of 95 children (MUAC between 11.5 cm and 12.5 cm) 18 (18.94%) came under grade I and 58 (61.05%) came under grade II of IAP classification. Associated co morbidities among children in the present study shows that among 200 patient 152 (76%) had anaemia, 44 (22%) had diarrhoea, 14 (7%) had pedal oedema, 12 (6%) had vitamin A deficiency, 44 (22%) had URTI and 24 (12%) had LRTI. Knowledge Aptitude and Practice study was done among 50 mothers and the result shows that mothers had less knowledge regarding what to be given in complementary feed, importance of immunization, birth spacing interval, and danger signs indicating illness.

Conclusion: The present study shows that WHO classification detected more children with malnutrition than IAP classification, which was true for both boys and girls. There was also disparity among results of WHO criteria IAP classification and MUAC classification. Single criteria can't be justified in assessing malnutrition. KAP study reveals that mother's knowledge is important in combating malnutrition.

Key words

Malnutrition, severe acute malnutrition, moderate acute malnutrition, WHO, IAP, MUAC.

Introduction

Nearly half of all deaths in children under 5 are attributable to under nutrition. This translates into the unnecessary loss of about 3 million young lives a year [1]. Under nutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and contributes to delayed recovery. In addition, the interaction between under nutrition and infection can create a potentially lethal cycle of worsening illness and deteriorating nutritional status. Poor nutrition in the first 1,000 days of a child's life can also lead to stunted growth, which is irreversible and associated with impaired cognitive ability and reduced school and work performance.

A country needs a well-nourished population of children, in order to have a healthy and productive labour force in future. Improved nutrition and health enhance the learning ability of children. In the long run it leads to an increase in the strengthening of the labour force and thereby it contributes positively for the economic growth.

The prevalence of underweight children in India is among the highest in the world, with dire for mobility, mortality, productivity and economic growth The World Bank estimates that India is one of the highest ranking countries in the world for the number of children suffering from malnutrition (wasting 15.1%, stunting 38.7%, underweight 29.4 %, severe wasting 4.6%) [2]. Under-nutrition is most prominent in the states of Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan. About half the children are underweight in Orissa, Maharashtra and West Bengal. About half the children are stunted in Assam and Haryana.

Protein energy malnutrition raises the risk of death and may reduce physical and mental capacity. Worldwide about 780 million people are estimated to be energy deficient according to the WHO standards. The WHO assessment of nutritional status is done according to weight for length (or height), height (or length) for age and presence of edema.

The WHO recommends the use of Z scores or standard deviation score (SDS) for evaluating anthropometry, so as to accurately classify individuals with indices below the extreme percentile. In India most pediatricians use IAP classification to classify grades of severity of malnutrition. Some previous studies have shown that there is a disparity between different classifications. Also there are disparities in different methodology so uniformity is not likely. In this study effort is made to compare WHO vs. IAP classifications for grading severity of malnutrition.

Various guidelines and measures have been formulated to counter the problems of malnutrition. The first National Guidelines on Infant and Young Child Feeding (IYCF) [3] were formulated by Ministry of Women and Child Development (Food and Nutrition Board) in 2004. Early initiation of breastfeeding, exclusive breastfeeding for the first six month of life followed by continued breastfeeding for up to two years and beyond with adequate complementary foods is the most appropriate feeding strategy for infants and young children. Adequate nutrition and anaemia control for adolescent girls, pregnant and lactating mother is also advocated in national guidelines on Infant and Young child feeding.

Strategies to improve Infant and Young Child Feeding (IYCF) are a key component of the child survival and development programs of many nations, supported by UNICEF and WHO. The scientific rationale for this decision is clear, with steadily growing evidence underscoring the essential role breastfeeding and complementary feeding as major factors in child survival, growth and development. The importance of breastfeeding as the preventive intervention with potentially the single largest impact on reducing child mortality has been highlighted. In addition, of the available nutrition interventions, improvement of complementary feeding have been shown to be most effective to improve child growth, and thereby, together with maternal nutrition interventions, to contribute to reducing stunting [4].

A mother is the principal provider of the primary care that her child needs during the first five years of its life. The type of care she provides depends to a large extent on her knowledge and understanding of some aspects of basic nutrition and health care. It is understandable that her educational status has been reported to influence her child-care practice. So if mother are made more aware about feeding practices of infant and other health care practices than it will go long way to improve the status of severity of malnutrition.

So this study is taken up to compare between WHO recommended classification of malnutrition vs. IAP recommended classification for the same and to evaluate K.A.P of mother of children visiting the O.P.D of department of paediatrics at Dhiraj hospital about infant feeding practices and health care activities as a whole.

Aim

- To assess the nutritional status of children between 6 months to 5 years of age attending tertiary rural hospital according to WHO criteria.
- To compare the result of this study with IAP classification for grading malnutrition.

Objectives

- To assess the knowledge of mothers regarding feeding practices and other health care practices among the children particularly below 2 years of age.
- To observe associated clinical problems and state of other nutrient deficiencies in the children of the study group.

Materials and methods

Study design: Cross sectional and observational study.

Study area: Paediatric ward and nutritional rehabilitation centre of Dhiraj hospital, Piparia, Waghodia, Vadodara.

Study period: April 2015 – September 2016

Study subject: Children (both male and female) between 6 month to 5 years of age and mothers admitted in paediatric ward, NRC (nutritional rehabilitation centre) and random 50 mothers of children attending O.P.D were taken in the study group.

Sample size: 200 children admitted in pediatric ward and NRC (nutritional rehabilitation centre) of Dhiraj hospital was taken for the study.

Inclusion criteria

- Children between 6months to 5 years of age admitted in Dhiraj hospital and their mothers who gave consent.

Exclusion criteria

- Participants whose parents were not willing to give consent for the study.

Method of collection of data

- After explaining purpose of the study to parents and taking permission from ethic committee of S.B.K.S.M.I&R.C, children from 6month to 5 years of age and their mothers admitted in Dhiraj hospital were enrolled in the study.
- After informed consent of parents or attendant of patients, who fulfilled the inclusion criteria, a thorough history including personal history, past history, family history, birth history, immunisation history, development history, feeding pattern including breast feeding practices and complimentary feeding practices was taken.
- General physical examination and systemic examination was done thereafter as per the proforma.
- Anthropometry was taken according to WHO guidelines and standard techniques. Anthropometry was analysed according to WHO criteria to grade nutritional status of these patients into normal, SAM and MAM (WHO).
- Nutritional status was also classified using IAP criteria in 5 grades- normal, grade 1, grade 2, grade 3, and grade 4. IAP classification detects percentage of expected weight for age of the standard.
- Comparison of results obtained from both the methods used viz. WHO standard and IAP classification was done.
- Severity of under nutrition using only MUAC criteria was also carried alternatively. The result was compared with WHO standard and IAP classification.
- Interrogation was done with children's mothers in the language they understood regarding young children feeding practices, health care practices and accordingly their knowledge regarding feeding habits was assessed. In interrogation a set of direct questions in their language were asked. A scoring system was applied to the set of answers for correct/ incorrect answer for the questions asked.
- This study was carried out for a period of one and half years.
- Data was compiled, categorized and analyzed by appropriate statistical method in

consultation with a statistician to prepare result.

- Data was saved for future references.

Methods applied to take anthropometry
Weight
Tared electronic weighing machine was used for all the children.

Child 2 years old or older and was able to stand:
If a child was 2 years old or older and was able to stand still stand still, child was weighed alone. Shoes and outer clothing were removed. Child was asked to stand in the middle of the scale, feet slightly apart, and to remain still until the weight appeared on the display. Child's weight was recorded to the nearest 0.1 kg. If the child jumped on the scale or was not standing still, tared weighing procedure was used instead.

Child less than 2 years old or was unable to stand:
The mother stepped on the scale to be weighed alone first. After the mother's weight appeared on the display, reading was reset to zero. Then child was given to her mother to hold. The child's weight appeared on the scale. Child's weight was recorded. The weighing machine was calibrated frequently.

Height
Measure length:
The child was laid on his back with his head against the fixed headboard, compressing the hair. The head was positioned so that an imaginary vertical line from the ear canal to the lower border of the eye socket was perpendicular to the board. Child was laid straight along the board while shoulders' touching the board, and the spine was not arched. Child's legs were held down with one hand and mobile footboard was moved with other. Gentle pressure was applied to the knees to straighten the legs without causing injury. While holding the knees, footboard was pulled against the child's feet. The soles of the feet were flat against the footboard, toes pointing upwards. Child's length was recorded in centimeters to the last completed 0.1 cm.

Measure height:
Stadiometer was fixed on a level ground. Shoes, socks and hair ornaments were removed. Child was held stand on the ground with feet slightly apart. The back of the head, shoulder blades, buttocks, calves, and heels were in contact with the vertical board. The trunk was balanced over the waist, i.e., not leaning back or forward. Child's head was positioned so that a horizontal line from the ear canal to the lower border of the eye socket runs parallel to the baseboard. With the head in position, the headboard was pulled down to rest firmly on top of the head while compressing the hair. Measurement was read and recorded in centimeters to the last completed 0.1 cm.

Mid upper arm circumference (MUAC)
Measurement was performed on the left arm, midway between the acromion and the olecranon. The clothing was uncovered over the arm. The measuring tape encircling the arm was held gently without pressing the soft tissues.

Instruments used for anthropometry:
Materials used were measuring tape, electronic weighing machine, stadiometer, infantometer and pre tested proforma.

Statistical Analysis
Proportions, Percentages and Chi-square test were used for the analysis of the data.

Statistical Software:
The Statistical software namely Epi-Info 3.5.1 and Stat Calc 6 were used for the analysis of the data and Microsoft Word and Microsoft Excel have been used togenerate graphs, tables, etc.

WHO classification [4]
- The assessment of nutritional status is done according to weight for length (or height), height (or length) for age and presence of edema. The WHO recommends the use of Z scores or standard deviation score (SDS) for evaluating anthropometry, so as to accurately classify individuals with indices below the extreme percentile.

- The calculation of the SDS gives a numerical score indicating how far away from the 50th centile for age the child measurement falls. A score of -2 to -3 indicates moderate malnutrition and a score of +2 to +3 SDS indicate overweight. A score of less than -3 SDS indicates severe malnutrition and a score of +3 indicates obesity.

Results and Discussion

In present study, total 200 patients were taken. **Table - 1** shows that out of 200 patients 108 (54%) were males and 92 (46%) were females. Hence distributions of males are more than female.

Table – 1: DISTRIBUTION OF CHILDREN TAKEN IN STUDY ACCORDING TO GENDER (n=200).

TOTAL NO OF PATIENTS	MALES		FEMALES	
200	108	54%	92	46%

Dongre AR, Deshmukh PR, Gupta SS and Garg BS (2007) [5] studied prevalence of underweight in Anganwadi children in Maharashtra. A cross-sectional survey was undertaken in Anganwadi centres of 20 villages of Primary Health Centre, Anji in December 2005. Out of 1491 under-six children studied, 52% were male and 48% were female. 51.78% of children were less than 3 years.

Harishankar, Shraddha Dwivedi, Dabral SB and Walia DK (2004) [6] conducted the study of nutritional status of children under 6 years of age in rural areas of Allahabad district of Uttar Pradesh. Majority of children were male (58.1%) as compared to female children (41.9%).

Table - 2 shows that 200 patient taken in the study, 76 (38%) were of the age group between 6months to 12 months and out of them 31(15.5%) were males and 45 (22.5%) were females. 86 (43%) patients were of the age group between 13 months and 36 months and out of

them 55 (27.5%) were males and 31 (15.5%) were females. 38 (19%) patients were of the age group between 37 months and 60 months out of them 22 (11%) were males and 16 (8%)were females. The distribution of patients was more in age group between 13 and 36 months with 43%, of which distribution of males were more than females.

Dongre AR, Deshmukh PR, Gupta SS and Garg BS (2007) [5] studied prevalence of underweight in Anganwadi children in Maharashtra. A cross-sectional survey was undertaken in Anganwadi centres of 20 villages of Primary Health Centre, Anji in December 2005. Out of 1491 under-six children studied, 52% were male and 48% were female. 51.78% of children were less than 3 years.

Amirthaveni M and Barikor CW (2002) [7] conducted the study of nutritional status of Meghalayan pre-school children' in the Mylliem block of Meghalaya state among 200 pre-school children. 47.5% of children were male and 52.5% of them were female.

Improper complimentary feeding practices and chance of frequent infection can cause more undernutrition in this age group.

Table - 3 shows that out of 200 children taken in the present study 127 (63.5%) fall under SAM and 73 (36.5%) fall under MAM according to WHO classification.

The study group patients are from N.R.C who were admitted for nutritional rehabilitation and hence SAM cases are more than MAMA cases.

Table - 4 shows the distribution of 200 children in the present study according to IAP classification. Out of 200 children 9 (4.5%) came under normal grade, 34 (17%) came under grade 1, 103 (51.5%) came under grade 2, 39 (17.5%) came under grade 3 and 15 (7.5%) came under grade 4. Result interprets that 51.5 % of the total children came under grade II of IAP classification

Table – 2: DISTRIBUTION OF CHILDREN TAKEN IN STUDY ACCORDING TO AGE AND GENDER (n=200).

AGE	PATIENTS		MALE		FEMALE	
6MONTHS – 12MONTHS	76	38%	31	15.5%	45	22.5%
13MONTHS -36 MONTHS	86	43%	55	27.5%	31	15.5%
37 MONTHS TO 60 MONTHS	38	19%	22	11%	16	8%
TOTAL	200		108		92	

Table – 3: DISTRIBUTION OF CHILDREN TAKEN IN STUDY ACCORDING TO SAM AND MAM (WHO CLASSIFICATION).

TOTAL PATIENTS	NO. OF PATIENTS OF SAM		NO OF PATIENTS OF MAM	
200	127	63.5%	73	36.5%

Table – 4: DISTRIBUTION OF CHILDREN TAKEN IN STUDY ACCORDING TO IAP CLASSIFICATION.

ACCORDING TO IAP CLASSIFICATION (n = 200)									
NORMAL		GRADE 1		GRADE 2		GRADE 3		GRADE 4	
9	4.5%	34	17%	103	51.5%	39	19.5%	15	7.5%

Table – 5: COMPARISON OF CHILDREN TAKEN IN STUDY ACCORDING TO WHO AND IAP CLASSIFICATION (n=200).

WHO CLASSIFICATION	IAP CLASSIFICATION									
	Normal		Grade 1		Grade 2		Grade 3		Grade 4	
		%		%		%		%		%
SAM- 127	3	2.36	14	11.02	59	46.45	37	29.13	14	11.02
MAM- 73	6	8.31	20	27.39	44	60.27	2	2.73	1	1.36
TOTAL 200	9		34		103		39		15	

Table - 5 shows the comparison of children according to WHO and IAP classification in the present study. Total 200 children were studied, of them 127 came under SAM and 73 came under MAM according to WHO criteria.

Out of 127 patients of SAM, 3 (2.36 %) came under normal grade, 14 (11.02%) under grade 1, 59 (46.45 %) under grade 2, 37 (29.13%) under grade 3, 14 (11.02%) under grade 4 of IAP classification. Out of 73 patients of MAM, 6 (8.31 %) came under normal grade, 20 (27.39%) under grade 1, 44 (60.27%) under grade 2, 2 (2.73%) under grade 3, 1(1.36%) under grade 4 of IAP classification. (p<0.001)

WHO classification detected more children with severe malnutrition than IAP classification.

Comparing with previous studies:

A cross-sectional study was undertaken by Mr Savitha and Nithin Kondapuram [8] to compare WHO and Indian Academy of Paediatrics (IAP) recommended growth charts compiled by

Agarwal. 2105 children aged less than 5 years, attending 132 Anganwadi centres in Mysore city, were included by simple random sampling method. Weight and height of all children were recorded and plotted on both WHO and IAP charts. WHO charts detected more boys as underweight compared to IAP charts. When weight charts of girls were compared there was no difference between the two charts. WHO charts detected more children with stunting than IAP charts, which was true for both boys and girls (P=0.001). Key words: Growth charts, WHO charts, IAP chart.

N Seetharaman, TV Chacko, SLR Shankar, AC Mathew in 2007 [9] conducted a study to compare the Z Scores system with the Indian Academy of Pediatrics (IAP) classification of undernutrition. The Study population comprised of Children less than five years of age with total number of 625 children. Only 31.4% of the children studied were normal; 68.6% were in a state of Anthropometric Failure. As per the Z score system, 49.6% were underweight (21.7% severely); 48.4% were stunted (20.3% severely) and 20.2% were wasted (6.9% severely). Whereas, as per IAP criteria, 51.4% were undernourished and 3.2% were severely undernourished. Using Underweight (low weight for age) as the only criterion for identifying undernourished children may underestimate the true prevalence of undernutrition, by as much as 21.9%. Conclusions: More widespread use of the Z Score system is recommended for identifying all the facets of undernutrition.

Table – 6: COMPARISON OF MUAC WITH WHO (SAM AND MAM) OF CHILDREN TAKEN IN THE STUDY (n=200).

MUAC (cm)	<11.5		11.5-12.5		>12.5-13.5		>13.5	
NO. OF CHILDRENS (n=200)	67	33.5%	95	47.5%	34	17%	4	2%

Table – 7: COMPARISON OF MUAC (SAM) WITH WHO (SAM) OF CHILDREN TAKEN IN THE STUDY.

WHO (SAM)	MUAC (SAM)	
127	67	52.75%

Table - 6 shows the comparison of children by MUAC and WHO classification in the present study. Total 200 children were included in the study that came under SAM and MAM according to WHO classification. According to MUAC criteria 67(33.5%) had MUAC <11.5cm, 95(47.5%) had MUAC between 11.5 and 12.5, 34 (17%) had MUAC between 12.5cm and 13.5cm and 4 (2%) had MUAC >13.5 cm. Thus result interprets that 67(33.5%) had SAM and 95(47.5%) had MAM according to MUAC criteria, remaining 19% did not fall under SAM and MAM.

JP Tripathy, A Sharma and S Prinja [10] collected anthropometric data of 2466 children in Haryana revealed low sensitivity (6.9%) and positive predictive value (14.3%) of Mid upper Arm Circumference (MUAC) at 115 mm cutoff for identifying severe acute malnutrition (SAM). This raises concerns regarding the reliability of MUAC as a screening tool to identify SAM at the community level.

Table - 7 shows that out of 200 children taken in the present study 127 came under SAM according to WHO classification and 67 came under SAM according to MUAC criteria. Thus result interprets that only 52.75% children came

under SAM according to MUAC criteria out of the 127 children of SAM according to WHO classification.

Comparing with a previous study JP Tripathy, A Sharma and S Prinja [10] collected anthropometric data of 2466 children in Haryana revealed low sensitivity (6.9%) and positive predictive value (14.3%) of Mid upper Arm Circumference (MUAC) at 115 mm cutoff for identifying severe acute malnutrition (SAM). This raises concerns regarding the reliability of MUAC as a screening tool to identify SAM at the community level.

Table – 8: COMPARISON OF MUAC AND IAP CLASSIFICATION OF CHILDREN TAKEN IN THE STUDY (n=200).

MUAC(CM)	<11.5		11.5-12.5		12.5-13.5		>13.5	
NO OF CHILDREN	67		95		34		4	
IAP NORMAL	1	1.49%	5	5.26%	3	8.82%	0	O%
IAP GRADE 1	7	10.93%	18	18.94%	7	20.58%	2	50%
IAP GRADE 2	28	41.79%	58	61.05%	15	44.11%	2	50%
IAP GRADE 3	21	31.3%	9	9.47%	9	26.47%	0	0%
IAP GRADE 4	10	14.9%	5	5.26%	0	0%	0	0%

Table – 9: ASSOCIATED COMORBIDITIES IN CHILDREN TAKEN IN THE STUDY.

COMORBIDITIES	NO. OF PATIENTS	PERCENTAGE
ANEMIA	152	76%
DIARRHOEA	44	22%
PEDAL OEDEMA	14	7%
VITAMIN A DEFICIENCY	12	6%
URTI	44	22%
LRTI	24	12%

Table - 8 shows the comparison of children according to MUAC criteria and IAP classification in the present study. Result shows that 67 children had MUAC <11.5 cm, and according to IAP classification 1(1.49%) came under normal grade, 7(10.93%) under grade 1, 28(41.79%) under grade 2, 21(31.3%) under grade 3 and 10 (14.9 %) under grade 4. 95 children had MUAC between 11.5 and 12.5 cm, and according to IAP classification 5 (5.26%)came under normal grade, 18 (18.94%) under grade 1, 58 (61.05%) under grade 2, 9 (9.47%) under grade 3 and 5 (5.29 %) under grade 4. 34 children had MUAC between 12.5 and 13.5 cm, and according to IAP classification 3 (8.82%) came under normal grade , 7 (20.58%) under grade 1, 15 (44.11%) under grade 2, 26.47% under grade 3 and 0 (0%)under grade 4. 4 children had MUAC >13.5 cm, and according to IAP classification 2(50%) came under grade1 and remaining 2 (50 %)under grade 2.Thus result interprets that out of 67 children (with SAM according to MUAC criteria) 21 (31.3 %) came under grade III and 10 (14.9%) came under grade IV of IAP classification. Out of 95 children (with MAM according to MUAC criteria)

18(18.94%) came under grade I and 58(61.05%) came under grade II of IAP classification.

Comparing with a previous study JP Tripathy, A Sharma and S Prinja [10] collected anthropometric data of 2466 children in Haryana revealed low sensitivity (6.9%) and positive predictive value (14.3%) of Mid upper Arm Circumference (MUAC) at 115 mm cutoff for identifying Severe acute malnutrition (SAM). This raises concerns regarding the reliability of MUAC as a screening tool to identify SAM at the community level.

Table – 10: RESULT OF KNOWLEDGE APTITUDE AND PRACTICE STUDY OF MOTHER TAKEN IN THE STUDY (n=50).

RESULT OF KAP STUDY		
	PERCENTAGE OF CORRECT ANSWER	PERCENTAGE OF INCORRECT ANSWER
Question 1	72%	28%
Question 2	78%	22%
Question 3	88%	12%
Question 4	84%	16%
Question 5	68%	32%
Question 6	54%	46%
Question 7	48%	52%
Question 8	34%	66%
Question 9	16%	84%
Question 10	32%	68%

Table - 9 shows associated comorbidities among children taken in the study. 152(76%) had anemia, 44(22%) had diarrhoea, 14(7%) had pedal oedema, 12(6%) had vitamin A deficiency, 44(22%) had URTI and 21(12%) had LRTI.

Sharma SP, Albal MV and Chandrorkar AG [11] conducted the study in the district Solapur of Maharashtra. The Anganwadi children from Pandharpur rural area and Solapur slum area were examined. Out of 2590 children examined, 55.44% were males and 44.56% were females. According to this study, prevalence of Vitamin A deficiency was 29.03% in males and 22.01% in females (overall – 25.52%). Vitamin A deficiency was more in low income group (26.50%). The prevalence of malnutrition was 51.29%, worm infestation was 36.4%, diarrhoea was 12.2% and respiratory tract infection was 9.6%.

Table - 10 shows the percentage of correct and incorrect answers. 10 questions were asked to 50 mothers in O.P.D. Result shows that mothers had less knowledge regarding what to be given in complementary feed, importance of immunisation, birth spacing interval, and danger signs.

Singh MB, Haldiya Kr, et al. (1997) [12]: A study conducted on infant feeding and weaning practices in a survey of 325 mothers living in 38 villages, Jaipur District, Rajasthan in India.

The study revealed that 81% mothers were illiterate and 65% were engaged in the agriculture.

Only 23% of mothers initiated breast-feeding within 24 hours of delivery and 77% discarded colostrums, depriving their infant of important nutrients. The study recommended village level education programs on infant nutrition.

Gupta MC, Mehrotra M, Arora S, Saran M [13]: In 1991 a study was conducted on human nutrition unit All India Institute of Medical Sciences, New Delhi. Severely malnourished children 26, weight for age 55.27 +/- 3.17, were identified in a colony of Muslim urban slum dwellers of low economic status. An equal number of normally nourished children matched for age, sex and per capita income were identified. A strong relation was found between nutritional status of the subjects and educational level of their mothers. It is concluded that maternal education and knowledge, attitude, practice are significantly and independently associated with children's nutritional status.

Conclusion

The present study shows that WHO classification detected more children with malnutrition than IAP classification, which was true for both boys and girls. There was also disparity among results of WHO criteria IAP classification and MUAC classification. Single criteria can't be justified in assessing malnutrition. KAP study reveals that mother's knowledge is important in combating malnutrition.

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