Nutritional status of pre-school children residing in urban areas of Bikaner city

Surbhi Shekhawat and Madhu Goyal

Nutritional status of 150 pre-school children (3-5years), studying in primary schools of Bikaner district (Rajasthan) was assessed by studying their anthropometric measurements, clinical and dietary status. Height and weight of the subjects were found to be 99.5 to 104.8 per cent and 86.0-107.5 per cent of the NCHS standards, respectively. The mean MUAC and chest/head circumference ratio (3-4 years) values of majority of the subjects were found as per the reference values. Prevalence of undernutrition and over-nutrition was noted to be 37.3 and 9.4 per cent, respectively. As per clinical examination majority of the subjects had normal status (77.3-97.3%). The per cent adequacy of food intake was ranging from 3.78-105.2 per cent. The per cent adequacy of nutrient intake ranged from 15.2-204.7 per cent. Findings of the present study indicate a scope of an intervention programme for betterment in food habits and lifestyle practices of pre-school children.

Key Words : Pre-school children, Nutritional status

INTRODUCTION

A pre-school or nursery school or preprimary schools is an educational establishment or learning space offering early childhood education to children between the ages of three and five, prior to the commencement of compulsory education at primary school (Wikipedia). According to WHO also pre-school is an early childhood programme in which children combine learning with play in a programme run by professionally trained adults.

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According to the academy of nutrition and dietetics, childhood is the most rapid period of growth in human life. A child needs adequate dietary intake to provide enough nutrients and energy for him to grow, without reducing his body's ability to stay healthy. Good nutrition helps to improve child survival, to promote healthy growth and development, to contribute better cognitive and economic development. It also reduces morbidity and mortality rate in children. Singh and Patra (2014) reported that about 89 million children in India are anemic. Malnutrition early in life cannot only affect physical growth but may also interfere with proper mental development. The prevalence of malnutrition in Rajasthan according to the National Family Health Survey-3(2005-06), found that 20 per cent of children under 3 years of age in Rajasthan were wasted, 34 per cent were stunted and 44 per cent were underweight and 7.3 per cent suffered from severe acute malnutrition. Children, therefore, must be adequately

fed so that they grow up into healthy adults. Malnutrition in pre-schoolers is also due to several other factors like lack of awareness about nutrition, micronutrient deficiencies, reduced biodiversity of nutrients, inadequate or inappropriate food intake, childhood disease, poor access to health services etc. In urban areas over-nourishment is also seen in kids may be due to impact of media, peer groups and excessive use of junk foods.It must be acknowledged that childhood is valuable human resource who will contribute substantially to the national economy, development and progress. Better the nutritional status of pre-schoolers higher will be nations rise because today's children are tomorrow's adults.There is a relative scarcity of available literature on such information particularly from arid areas like Bikaner district (Rajasthan). Keeping this in view, present study had, therefore, been planned and designed to assess nutritional status of pre-school children of Bikaner district.

METHODOLOGY

The study was conducted on 3-5 years old pre-school children studying in primary schools of Bikaner (Rajasthan).This facilitated gathering of information about their nutritional status.The first step of the study, taken by the investigator was to obtain the exhaustive list of all Government or non-Government primary schools of urban areas of Bikaner district (Rajasthan). The list was procured from the district Education Department, Rani Bazaar, Bikaner (Rajasthan) after submitting a written request. Thereafter, thirty per cent of the enlisted schools were randomly selected. Thus, the study was conducted at seven primary schools of Bikaner *i.e.* Ganga Children Govt. School, Euro Kids Play Group, Shishu Vihar School, Mother's Pride Play Group, Sanskaar Play Group, St. Vivekananda School and R.S.V Primary School. After seeking prior permission and having discussion with the

respective school authorities a list of children belonging to the age group of 3-5 years, was prepared. These children were studying either in class Play group or Nursery or LKG or UKG or I^st standard. Out of the procured lists, 150 children were randomly selected from the seven identified schools on the basis of probability proportionate to size sampling (PPS) technique. Regularity in attending the school as well as willingness of the parents of the subjects to cooperate during the study was also taken care before selection of the subjects.

Statistical analysis of the data:

The percentage, mean and standard deviation were used during present study for statistical analysis of the findings. 'The statistical analysis was carried out with the help of 'IBM statistical package for the social sciences, statistics software.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads:

Anthropometric assessment:
Height for age:

Height is affected only by long-term nutritional deprivation; it is considered as an index of chronic or long duration malnutrition (Srilakshmi, 2008). It is clear from the Table 1 that the mean height values were found to be 99.5 to 104.8 per cent of the NCHS standards. Further, the boys were noted to be taller than girls. Similar to present findings, Lenka *et al.* (2013) also reported that boys were taller than girls while studying pre-school children of Odisha for their nutritional status. The findings of present study about height measurements fall in the

Age (in years)	Gender (n=150)	Height (cm) NCHS standards	Mean ± SD (cm)	Per cent adequacy	Weight (kg) NCHS standards	Mean ± SD (kg)	Per cent adequacy
3	Boys (n=32)	94.9	95.8 ± 3.3	100.9	14.6	15.7 ± 4.5	107.5
	Girls (n=27)	93.9	92.2 ± 4.7	98.1	14.1	13.9 ± 2.5	98.5
4	Boys (n=35)	102.9	104.4 ± 6.0	101.4	16.7	14.9 ± 1.84	89.2
	Girls (n=24)	101.6	100.9 ± 8.12	99.3	16.0	15.01 ± 2.06	93.8
5	Boys (n=15)	109.9	111.2 ± 6.5	101.1.	18.7	16.1 ± 1.8	86.0
	Girls (n=17)	108.4	107.9 ± 7.45	99.5	17.7	15.9± 1.7	89.8
	Overall mean		100.9 ±8.3		Overall mean	15.2 ± 3.17	

Table 1 : Distribution of the subjects according to their height and weight

Note: Values in parenthesis indicate percentage of the subjects

range reported (103.6- 109.3 cm) by Wankhede *et al.* (2015) while studying mean height of 4 and 5 years boys and girls residing in Madhya Pradesh.

Weight for age:

Weight of an individual indicates the current nutritional status. It is proportional to the dietary intake and any fluctuation may lead to malnutrition of either deficit or excess. Therefore, weight deficiency may be a precise indicator of the prevalence of protein energy malnutrition among any age group (Gibson, 1990). It can be perceived from the Table 1 that the mean values for body weight of the subject were noted to be 86.0-107.5 per cent of the NCHS standards.

Mid upper arm circumference (*MUAC*):

The measurement of mid upper arm circumference for determining community nutritional status appears to

be useful in practice and ease of performance (Rao *et al.,* 1976). In the present study, the mean value of MUAC was found to be 15.6 ± 1.11 and 14.73 ± 1.55cm for 3-4 and 4-5 years of the subjects indicating 97.5 and 92.0 per cent adequacy of reference value (16.0 cm), respectively. Srilakshmi (2010) also has stated that MUAC correlated well with body weight. Lenka *et al.* (2013) also had reported low MUAC adequacy (73.29-83.12 %) for preschool children (1-5 years) of Odisha.

Head and chest circumference:

Head size relates mainly to the size of brain, which increases quite rapidly during infancy. The chest in a normally nourished child grows faster then head during the second and third year of life. According to present data, the chest/head circumference ratio was calculated and the values were found to be 1.02± 0.93 and 0.99 ± 0.72 cm for both the age groups, respectively.

Table 2: Distribution of the subjects according to their MUAC

Age wise no. of subjects	Mid upper arm circumference standard* value	Mean ± SD (cm)	Per cent adequacy
3-4 years (n=59)	16	15.6 ± 1.11	97.5
4-5 years (n=91)	16	14.73± 1.55	92.0

Note: Values in parenthesis indicate percentage of the subjects   * NCHS (1990)

Table 3: Distribution of the subjects according to their head and chest

Age wise no. of subjects	Mean ± SD (cm)		Chest and head circumference ratio		Per cent adequacy
	HC	CC	Reference value*	Mean ± SD	
3-4 years (n=59)	49.4 ±2.5	50.8 ± 1.9	>1	1.02 ± 0.93	102
4-5 years (n=91)	50.0±2.29	49.7± 2.7	-	0.99 ± 0.72	-

Note: Values in parenthesis indicate percentage of the subjects   *NCHS (1990)   HC= Head circumference, CC = Chest circumference

Table 4 : Mean values of food intake of the subjects (3-4 year)

Nutrients	Suggested intake*	Mean ± SD intake (n=59)	Per cent adequacy
Cereals, grains and products	120	139.7 ± 35.7	116.4
Pulses and legumes	30	10.0 ± 5.9	33.4
Leafy vegetable	50	1.89 ±4.45	3.78
Roots and tubers	50	14.57 ± 10.4	29.14
Other vegetable	50	8.81 ± 8.01	5.87
Fruits	100	57.17 ± 59.6	57.17
Milk and milk products	500	332.5 ± 136.9	66.5
Fat (visible)	20	20.88 ± 5.97	104.4
Sugar	25	11.88 ± 9.19	47.52
Meat and poultry	-	13.07 ± 36.2	-
Nuts and oil seeds	-	5.35 ± 8.5	-

Note: Values in parenthesis indicate percentage of the subjects   * IDA,2011

Dietary assessment:

Food intake:

The nutritional status of any individual is directly associated to his food intake. During pre-school age, additional amount of nutrients are needed to support growth and development (Robinson, 1988). All the individual need a wide range of nutrients to lead a healthy and active life from the foods they consume daily. The components of diet need to be chosen judiciously so that it provides all the nutrients in proper amount and appropriate proportions (ICMR, 1989).The per cent adequacy of food intake by the subjects was ranging from

3.78-116.4 per cent. The Table 4 and 5 indicates that more than adequate intake of cereals and visible fat and inadequate intake of other vegetable, fruits, roots and tubers by the subjects.

Intake of fruits and vegetables was also noted to be lower than RDI by Tara *et al.* (2010) similar to present findings. Awasthi and Kumar (2011) while carrying out a study on nutritional status of 3-4 year old pre-school children in Kanpur also reported more than adequate intake of cereals and inadequate intake of other vegetable, roots and tubers by the subjects under their study.

Similarly, the results regarding food intake of 4-5

Table 5: Mean values of food intake of the subjects 4-5 years

Nutrients	Suggested intake*	Mean ± SD (n=91)	Per cent adequacy
Cereals, grains and products	210	138.2 ± 33.6	65.8
Pulses and legumes	45	10.14 ± 6.8	22.5
Leafy vegetable	50	1.90 ± 4.19	3.8
Roots and tubers	100	12.60 ± 9.6	12.6
Other vegetable	50	6.84 ± 8.30	13.68
Fruits	100	52.7 ± 50.03	52.7
Milk and milk products	500	292.3 ± 125.6	58.46
Fat (visible)	25	26.3 ± 5.4	105.2
Sugar	30	19.3 ± 12.0	64.4
Meat and poultry	-	16.3 ± 43.8	-
Nuts and oil seeds	-	6.23 ± 9.97	-

Note: Values in parenthesis indicate percentage of the subjects * IDA,2011

Table 6 : Mean nutrient intake of the subjects (3-4 years)

Nutrients	Suggested intake*	Mean ± SD intake (n=59)	Per cent adequacy
Energy (kcal)	1060	1081.9± 441.6	102
Protein (g)	16.7	34.2± 21.1	204.7
Carbohydrate (g)	172.2	141.1± 47.9	81.9
Total fat (g)	27	42.3 ± 18.3	156.6
Visible fat (g)	13.5	14.1 ± 5.9	104.4
Invisible fat (g)	13.5	28.2 ± 12.4	208.8
-carotene (µg)	3200	521.7 ±87.5	16.3
Retinol (µg)	400	444.00 ± 37.61	111.0
Thiamine (mg)	0.5	0.7 ± 0.3	140
Riboflavin (mg)	0.6	0.8 ± 0.4	133.3
Niacin (mg)	8	6.65± 2.19	83.1
Vitamin C (mg)	40	20.2 ± 16.7	50.5
Calcium (mg)	600	517.1± 196.6	86.1
Iron (mg)	09	8.63 ± 27.7	95.8
Zinc (mg)	5	2.10 ± 1.0	42

Note: Values in parenthesis indicate percentage of the subjects *ICMR, 2010

Table 7: Mean values of nutrient intake of the subjects 4-5 years

Nutrients	Suggested intake *	Mean ± intake(n=91)	Per cent adequacy
Energy (kcal)	1350	1096.94± 632.02	81.2
Protein (g)	20.1	30.2± 19.4	150.2
Total fat (g)	25	42.46 ± 20.58	169.84
Visible fat	12.5	13.16 ± 5.48	105.2
Invisible fat	12.5	29.3 ± 15.1	234.4
Carbohydrate (g)	219.3	148.5± 92.3	67.8
-carotene (µg)	3200	487.5 ± 81.15	15.2
Retinol (µg)	400	456.04 ± 10.70	114.0
Thiamine (mg)	0.7	0.8 ± 1.0	114.2
Riboflavin (mg)	0.8	0.8 ± 1.2	100.0
Niacin (mg)	11	6.62± 2.7	60.18
Vitamin C (mg)	40	20.71 ± 16.2	51.7
Calcium (mg)	600	468.7± 189.4	78.1
Iron (mg)	13	8.68 ± 3.0	66.7
Zinc (mg)	7	2.4 ± 1.4	34.2

Note: Values in parenthesis indicate percentage of the subjects   *ICMR, 2010

Table 8: Distribution of the subjects according to their clinical assessment (n=150)

Sr. No.	Clinical signs	Age wise no. of subjects		Total subjects
		3-4 years (n=59)	4-5 years (n=91)	
1.	**Hair**			
	Normal	52 (88.1)	82 (90.1)	134 (89.4)
	Lack of lusture	7 (11.9)	9 (9.9)	16 (10.6)
2.	**Face**			
	Normal	57 (96.6)	85 (93.4)	142 (94.6)
	Paleness	2 (3.4)	4 (4.4)	3 (2.0)
	Depigmentation	-	2 (2.2)	2 (1.4)
3.	**Eyes**			
	Normal	57 (96.7)	84 (92.3)	141 (94.0)
	Pale conjunctiva	-	2 (2.2)	2 (1.4)
	Conjunctiva xerosis	2 (3.3)	5 (5.5)	7 (4.6)
4.	**Lips**			
	Normal	49 (83.1)	67 (73.6)	116 (77.3)
	Dry and cracked	10 (16.9)	24 (26.4)	34 (22.7)
5.	**Tongue**			
	Normal	57(96.6)	87 (95.6)	144 (96.0)
	Scarlet and raw tongue	2 (3.4)	4(4.4)	6 (4.0)
6.	**Teeth**			
	Normal	58 (98.3)	86 (94.5)	144 (96.0)
	Dental caries	1 (1.7)	5 (5.5)	6 (4.0)
7.	**Skin**			
	Normal	50 (84.7)	78 (85.7)	128 (85.3)
	Dry	9 (15.3)	13 (14.3)	22 (14.7)
8.	**Nails**			
	Normal	58 (98.4)	88 (96.7)	146 (97.4)
	Brittle	1 (1.6)	3 (3.3)	4 (2.6)

Note: Values in parenthesis indicate percentage of the subjects

years age group are in accordance with Chandana and sehgal (2011) who also found that the daily mean intake of cereals, pulses, green leafy vegetables, milk and milk product and sugar and Jaggery was lower than the RDA in the diets of pre-school children.

Nutrient intake:

Food is the conveyer of nutrients and consumption of adequate diet is required for maintenance, repair, growth and development of the body. Low intake of any of the nutrient can lead to a significant contribution to poor anthropometric, clinical and over all nutritional status. Average nutritional composition of the diet was calculated in terms of raw weight and the results of present study were compared with recommended dietary intake (ICMR, 2010). The adequacy of protein, fat, thiamine, riboflavin and retinol was noted to be 111.0-204.7 per cent of RDA for both the age groups. Energy intake of 3-4 year old subjects was adequate (102.0%) and for the elder group it was noted to be 81.2 per cent of RDA. Intake adequacy of carbohydrate, niacin, calcium and iron ranged between 66.7-95.8 per cent. Adequacy of β-carotene, vitamin C and zinc intake varied between 15.2-51.7 per cent of RDA for both the age groups. Swaminathan *et al.* (2005) conducted a study on dietary pattern of children belonging to higher socio-economic strata at south India, also noticed that intake of total fat was higher and carbohydrate was lower than RDA alike present findings. The present findings about mean nutrient intake are almost in conformity with those reported by Ndiku *et al.* (2007), who also found that energy intake, was high in pre-school children.

Clinical assessment:

Clinical examination is another method for assessing the nutritional status and prevalence of deficiency diseases. Essentially the method is an examination for changes believed to be related to inadequate nutrition that can be seen or felt in superficial epithelial tissues especially the skin, hair, face, eyes, lips, tongue, teeth, nails, etc. In the present study, such clinical signs had been assessed as suggested by Jelliffe (1966) for both the age groups.

Clinically majority of the subjects had normal hair (88.1– 90.1 %), face (93.4-96.6 %), eyes (92.3-96.7 %), lips (73.6-83.1 %), tongue (95.6-96.6 %), teeth (94.5-98.3%), skin (84.7-85.7 %) and nails (96.7-98.4 %) (Table 8).

Conclusion:

Due to high intake of fat, majority of the subjects in both the age groups had normal health status with reference to their body weight. But, their food habits showed remarkable deficiencies in the intake of vegetables, fruits and pulses. This resulted into overall low intake of β-carotene, vitamin C, niacin and minerals. The present findings, therefore, open up avenues for further studies on promotion of healthy food habits through nutrition intervention programmes. It is recommended that promotion of healthy food habits especially with reference to vegetables and fruits is an urgent need for pre-school children.

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