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Nutritional status of pre-school children residing in Western Rajasthan

Aditi Upadhyay and Vimla Dunkwal

Rajasthan being a state of northern India is well known for its hyper arid partial irrigated agro-climatic zone. Along with vivid cultural practices this zone is a place arid horticulture which is suitable for cultivation of arid foods. Arid foods are nutrient dense foods especially micronutrients. Despite of such advantageous foods pre-school malnutrition is still prevailing in Rajasthan. A multi-staged cross-sectional study carried out in Bikaner east (a legislative constituency of Bikaner district situated in western Rajasthan) to estimate the prevalence of malnutrition among pre-school children (24-71 months) studying in private and government schools of the district. Results revealed that out of 200 children belonging to private schools, 21 per cent were suffering from stunting, 55 per cent were wasted and 63 per cent were underweight. While children from government school (200) reported 49 per cent underweight children, 18 per cent stunting and 31 per cent were wasted. Obesity and overweight was also evident among the subjects. Dietary assessment showed that children were consuming adequate amount of milk and milk products, cereals, roots and tubers but daily intake of fruits, green leafy vegetable and pulses was found to be low. Nutrient intake of iron, β-carotene, calcium, zinc and vitamin C was found to be low as compared to the daily nutrient recommendation for the age group. This implied that children may have micronutrient deficiencies which could be a serious issue. Results also points out the conclusion that rural influence, lower socio-economic condition, higher birth order, lower birth interval, maternal health, literacy level of parents, agricultural diversity and faulty feeding habits have adverse effects on nutritional status of children. Strategies should be implemented to educate parents and other child care givers to efficiently utilize the available food resources and nurturing practices to improve the nutritional status of their pre-school children.

Key Words : Pre-schoolers, Malnutrition, Obesity, Stunting, Wasting, Underweight, Nutrients

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INTRODUCTION

India is home to the largest number of children in the world. Nearly every fifth young child in the world lives in India. On that account Rajasthan has 15.5 per cent (of total population of Rajasthan) children of the age group 0-71 months, which is more in rural areas (16.3%) as compared to urban areas (13.1%). Pre-school children are the most susceptible group towards Malnutrition. Infant mortality rate though reduced but still prevailing in the state (NFHS-4). Malnutrition refers to the situation where there is an unbalanced diet in which some nutrients are in excess, lacking or in wrong proportion. Technically malnutrition can be defined as a

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state of nutrition where the weight for age, height for age and weight for height indices are below -2 Z-score/ above +2 Z-scores of the NCHS reference (WHO, 2008). It can be categories as undernutrition and overnutrition. Children with severe acute malnutrition (SAM) are very thin, but they often have swollen hands and feet, making the internal problems more evident to health workers (UNICEF, 2017). Children with severe malnutrition are very susceptible to infections. Undernutrition in children causes direct structural damage to the brain and impairs infant motor development and exploratory behaviour. Children who are undernourished before age two and gain weight quickly later in childhood and in adolescence are at high risk of chronic diseases related to nutrition (Victora *et al*., 2008). In children aged 6–59 months, an arm circumference less than 110 mm is also indicative of severe acute malnutrition. Apart from marasmus and kwashiorkor (the 2 forms of protein- energy malnutrition) micronutrient deficiencies also exist among these children. Deficiencies of iron, iodine, vitamin A and zinc are the most common in developing countries. In these countries, a high prevalence of poor diet and infectious disease regularly unites into a vicious cycle (Sachdev, 1996). According to national family health survey (NFHS-4) report released in 2015-16 revealed that in Rajasthan children under five were found to be malnourished. Overall percentage of severely stunted (17%), stunted (41%), wasted (5.9%), severely underweight (11.1%), overweight (2%) and obese (1%) children was declined as compared from previous survey (NFHS- 3, 2005-6) but still prevalent.

METHODOLOGY

Study design:

A multi-staged cross-sectional study was carried out in Western Rajasthan. Among five agro-climatic zones of western Rajasthan Hyper arid partial irrigated zone was selected purposively for the study. Bikaner district was selected randomly among three districts of selected zone. Out of seven legislative constituencies of Bikaner, one constituency (Bikaner east) was selected randomly. After that a list of registered private and government primary schools was procured from Education Department, Bikaner. Selected school were than visited and surveyed to identify the strength of preschool children. 400 children, 200 from each category of school were selected by applying probability proportionate to sampling technique.

Anthropometric assessment:

Selected subjects were contacted at their respective school and examined closely for the physical assessment. Physical parameters like height, weight, BMI and mid-upper arm circumference (MUAC) were measured by using standard methods (Cameron, 1978; Robinson *et al.*, 1988 and Jellife, 1966). Due to constraints like, age of the subjects, less understanding during this age group, non co-operation of the subjects, etc. the questionnaire were sent with the subjects to their home, in order to get them filled up by their parents or guardians. These parameters were examined according to child growth standards given by WHO (2008) and then interpreted by using standard methods given by NCHS (National Center for Health Statistics, 1983), ICMR (Indian Council of Medical Research, 2008) and WHO (2008) classifications.

Dietary assessment:

Dietary assessment of all the subjects was carried out to assess their nutrient intake. Detailed information regarding the dietary pattern of the subjects was procured by using structured interview schedule. A 24 –hour dietary recall method for three consecutive days was adopted to find out the intake of various foods consumed by the subjects. The data was computed as per defined by the parents of the subjects. Raw and cooked amounts were quantified either in terms of household measures or by weight and numbers. These values were then converted to raw weight of food in grams and the nutritive value was calculated using the food consumption tables (Gopalan *et al.*, 1989). Intake of various foods consumed by the subjects was estimated and food adequacy ratio was calculated and then compared with that of the balanced diet given by Gopalan *et al*. (1989) for preschoolers aged (24-47 and 48-71 months).

Statistical analysis:

The data obtained was statistically analyzed by using suitable statistics to find out significance of the result (Gupta, 1998). In present study, results are expressed as mean± SD. The obtained data was statistically analyzed by using SPSS (IBM SPSS statistics subscription new). Student's t- test for equal variance was used for comparing the data from two types of schools. Level of significance was taken as 0.05 per cent.

OBSERVATIONS AND ASSESSMENT

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

General information:

Per cent distribution of the subjects revealed that out of 200 subjects from private schools 60 per cent were girls while 40 per cent were boys. Whereas, from government school the percentage of girl child was low (28%) as compared to boys (72%). An overall picture that emerges from the data indicates that out of 400 subjects only 3 per cent of children were from 24-35 months (2-3 years) of age group while, maximum children (54%) were reported from 60-71 months (5-6 years) of age group. Moreover, subjects from age group 36-47 months (3-4 years) were 11 per cent and 32 per cent subjects were from 48-59 months (4-5 years) of age group (Fig.1 and 2).

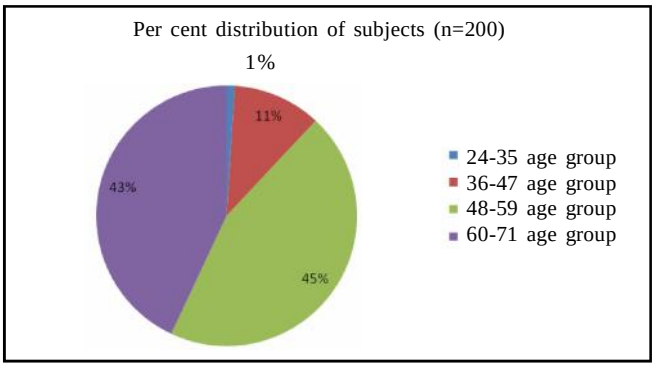

Fig. 1 : Per cent distribution of subjects from private schools

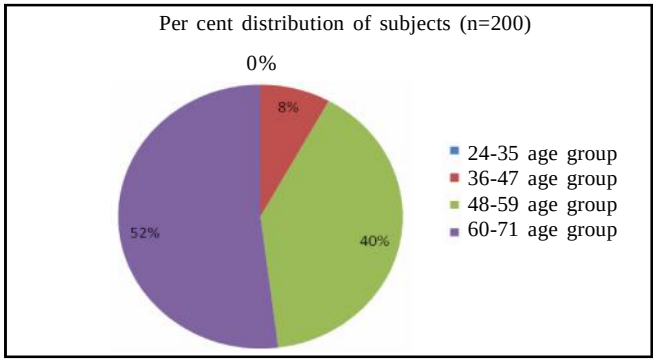

Fig. 2 : Per cent distribution of subjects from government schools

Type of family was classified in terms of joint and nuclear and it is evident from the analysis that maximum number of subjects (private schools) *i.e.*, 77 per cent belonged to nuclear family while only 23 per cent children were from joint family. Whereas, 70 per cent children hailed from nuclear family and 30 per cent were from nuclear family (government schools). Maximum number of children belonged to middle income group (46%) and was vegetarians (60%). Majority of parents were literate except 8 per cent mothers and 1 per cent father's who have never been to school.

Table 1 : Comparison between mean anthropometric scores of 24-47 months age group subjects from private and government schools

Parameters	Mean anthropometric scores of private schools	Mean anthropometric scores of government schools	t-value	Level of significance	Reference value (WHO, 2008)
Weight (kg)	15.1±3.6 (105)	13.6±2.9 (93)	4.8	S	14.3
Height (cm)	103.1±4.7 (108)	100.1±5.4 (104)	3.2	S	95.4
BMI (kg/m^2)	14.5±3.3 (93)	13.6±2.8 (88)	2.5	S	15.5
MAUC (cm)	14.5±1.6 (92)	14.2±1.9 (90)	1.2	NS	15.6

Level of significance: Significant at P<0.05 and non-significant at P>0.05
Degree of freedom: 198, Mean ± Standard deviation, BMI= Body mass index, MUAC= Mid upper arm circumference

Table 2 : Comparison between mean anthropometric scores of 48-71 month age group subjects from private and government schools

Parameters	Mean anthropometric Scores of private schools	Mean anthropometric scores of government schools	t-value	Level of significance	Reference value (WHO, 2008)
Weight (kg)	15.9±2.7 (86)	14.5±3.2 (79)	5.9	S	18.4
Height (cm)	109.1±7.6 (99)	106±1.9 (104)	1.2	NS	110
BMI (kg/m^2)	13.6±2.2 (89)	12.9±2.4 (85)	4.2	S	15.2
MAUC (cm)	15.7±1.5 (94)	15.4±1.2 (90)	0.8	NS	16.7[a]

Level of significance: Significant at P<0.05 and non-significant at P>0.05
Degree of freedom: 198, Mean ± Standard deviation, BMI= Body mass index, MUAC= Mid upper arm circumference,
x[a]= Data is only available for 48-59 months

Nutritional status of subjects:

Analysis of data revealed that subjects of age group 24-47 months from private school reported mean weight as 15.1±3.6 which was observed as 105 per cent of the reference value. Mean height was recorded as 103.1±4.7 with mean BMI score 14.5±3.3. Mid upper arm circumference was measured as 14.5±1.6 which was 92 per cent of the reference value (WHO, 2008). These findings were significantly different (P<0.05) from the parametric results of government school. Subjects from government school reported mean weight as 13.6±2.9, mean height as 100.1±5.4 and BMI (Body mass index) as 13.6±2.8. Difference between mean scores of mid upper arm circumference was found to be statistically non-significant (P>0.05).

Similarly, subjects with age group 48-71 months from private school reported mean weight scores 15.9±2.7, mean height score as 109.1±7.6 and mean BMI score as 13.6±2.2 (Table 2). Moreover, subjects from government schools showed mean weight score as 14.5±3.2, mean height as 106 ±1.9, mean BMI as 12.9±2.4 and MUAC as 15.4±1.2. Statistical analysis brings out a conclusion that the mean scores from both schools were significantly different from each other (P<0.05) except mean scores of height and MUAC.

Above findings brings out a conclusion that mean anthropometric scores of subjects from private schools were good and higher as compared to the scores of the subjects from government schools. Nutritional status based on height for age reflects that majority (79%) of subjects from private school were normal as compared with the cutoff values given by WHO, 2008 and NCHS 1983 whereas, 18 per cent reported stunting and 4 per cent severe stunting. Similarly, 21 per cent stunting and 9 per cent severe stunting was observed in the subjects belonging to government schools with 70 per cent subjects having normal height for their age. Likewise, subjects from private school exhibit same trend with wasting as 27 per cent, severe wasting as 17 per cent and 53 per cent subjects with normal weight for age. Subjects from government school presented quite same results of wasting (31%) and severe wasting (21%) as well. BMI for age analysis interpreted that subjects from private school were more towards obesity (3%) and overweight (6%) with 8 per cent severely underweight children. While obesity was not evident in the subjects from government schools and overweight children were less (4%) as compared to private schools. Per cent distribution of underweight children was more (49%) as compared to private schools (36%).

Dietary assessment:

Inference drawn from dietary assessment of the subjects (24-47 months) from both the categories of schools revealed that mean dietary consumption of milk and meat products was recorded to be highest as 548.8±3.8 g/day (109% of suggested intake) from private schools and 450±2.8 (80% of suggested intake) from government schools. Cereals and millets intake was also good from both the categories as 94.5±10.8 from private schools and 84.2±8.6. Mean food intake of pulses was low 3.5±6.6 among the subjects from government schools while 6.8±7.9 was noted for the from private schools. Per cent adequacy of green leafy vegetables consumption was also low as 11 per cent by the subjects from private schools and 14 per cent from government school. Daily dietary intake of fruits was extremely low among the subjects from government schools (5.5±3.2) while it was good among the subjects from private schools (60.2±5.2). On the same note, subjects (48-71 months) from private school were observed to be consuming 649.8±3.8 g/d milk and meat products while subjects from government schools reported 426.5±4.1 which is lower than that of private schools. Mean cereal intake was identified as 95.6±7.4 by the subjects from government school whereas 110±8.8 g/d was recorded from the subjects of private school. Unlikely intake of pulses was seen lower among subjects from government school (6.8±4.8) as compared with private schools (10.9±5.5). Mean daily consumption of green leafy vegetables was calculated low among the subjects from private schools (10.5±4.5) as compared with the subjects from government schools (13.8±5.5). Daily dietary intake of fruits was nil among the subjects from government schools whereas it was fairly good among the subjects from private schools (50±2.3). Statistical comparison between mean food intakes of subjects from private schools between government schools showed significant difference at 0.05 per cent level of significance.

Conclusion:

Inference drawn from the above finding reflects that subjects studying in private schools were comparatively healthier than the subjects from government schools. Food

intake was also good among the subjects from private schools. Results also points out the relationship between the child's nutritional status and their dietary practices. Obesity and overweight was also evident among the subjects which is also a serious issue. Balanced diet and some changes in life style are viable in nurturing a healthy kid. Several studies are in agreement with finding of present research which suggests that family income, rural influence, maternal health, literacy level of parents, life style, faulty dietary practices, higher birth order, lower birth interval and agricultural diversity has a massive impact on the nutritional status of pre-school children (Singh *et al.,* 2010; Khadilkar *et al.,* 2010; Shoeps *et al.,* 2011; Zon *et al.,* 2015 and Ranjani *et al.,* 2016).

Recommendations:

Rajasthan being a state of cultural and agricultural diversity can nurture healthy kids by communicating nutritional education and awareness among the parents. Several nutritionally dense arid foods like pearl millet, tumba, moth, amla, ker, kachari, dates, watermelon, groundnut, spinach, pumpkin etc. from western Rajasthan can be used as supplementary food against expensive nutrient rich foods. These foods are exceptionally good sources of micronutrient (zinc, vitamin C, β–carotene, iron magnesium, calcium, etc) and some macro nutrients. These foods can be processed to prepare different exciting food products/recipes to make them more palatable for children. Certain method demonstrations can be planed physically or through digital media to equip parents and other child care givers.

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