

## Original Research Article

# Nutritional assessment in developmentally retarded children of 3-10 years age group

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## ABSTRACT

**Background:** Intellectual disability is a condition of arrested or incomplete development of mind of a child and is specifically characterized by sub average intellectual functioning existing concurrently with limitations in conceptual, social, practical adaptive skills. Non-nutritional factors may influence growth, but nutritional factors such as insufficient calorie intake, excessive nutrient losses and abnormal energy metabolism also contribute to growth failure.

**Methods:** A hospital based descriptive study was conducted where children with intellectual disability of 3 years to 10 years age group brought to child psychiatry OPD during the study period were enrolled in the study. The study was conducted in Government Medical College, Nizamabad which is a teaching hospital. Study period was for one and half year - from January 2017 to June 2018.

**Results:** Out of 100 children with intellectual disabilities 32% of children were 2-5 years and 68% of children were 6-10 years. 64% of children were thin with a BMI <5th percentile and 36% of children were normal BMI falling in the range of 5th-85th percentile. Energy intake, calcium, iron and zinc intake were low in all age groups of children with intellectual disabilities.

**Conclusions:** Regular assessment of nutritional status of intellectually disabled children may be of value in correcting nutrient deficiencies promptly, as nutrient intake has a bearing on the growth, development and stature of an individual. Hence early detection and nutritional intervention prevents malnutrition and increases the quality of life in children with intellectual disabilities.

**Keywords:** Children, Dietary intake, Intellectual disability, Nutritional assessment

## INTRODUCTION

The terms mental retardation/developmental retardation have been replaced with Intellectual disability in the recent classification DSM 5. It is diagnosed before 18 years of age. Intellectual disability is a condition of arrested or incomplete development of mind of a child and is specifically characterized by sub average intellectual functioning existing concurrently with limitations in conceptual, social, practical adaptive skills.

Intellectual disability involves impairment of general mental abilities that impact adaptive functioning in 3 domains:

- The conceptual domain includes skill in language, reading, writing, math, reasoning, knowledge and memory.
- The social domain refers to empathy, social judgement, inter personal communication skills, the ability to make and maintain friendships, and similar capacities.

- The practical domain centres on self-management in areas such as personal care, job responsibilities, money management, recreation, and organizing school and work tasks.

In DSM-5 Intellectual disability is considered to be approximately two standard deviations or more below the normal population which equals to an IQ score of 70 or below. The prevalence of intellectual disability in India is 2-3% of general population.<sup>1</sup> Disabled children are known to be at high risk for developing malnutrition which may partly explain the growth retardation often encountered in such children.<sup>2,3</sup>

Non-nutritional factors may influence growth, but nutritional factors such as insufficient calorie intake, excessive nutrient losses and abnormal energy metabolism also contribute to growth failure. The deleterious effect of early malnutrition on later intellectual development in children in developing countries has been clearly documented.<sup>4</sup>

Under nutrition is associated with a decrease in cerebral function (Stoch et al, Grantham-McGregor et al. 1991) with possible exacerbation of existing neurological impairments.<sup>5</sup> Chronic under nutrition may be associated with increased irritability, and decreased motivation and energy available for non-essential activities such as play and rehabilitation (Stallings et al).<sup>6</sup> Significant developmental progress has been shown to accompany improved nutritional status (Sanders et al).<sup>7</sup> 30-80% of children with developmental disability have feeding difficulty. They are at high risk of oral and pharyngeal dysphagia due to oromotor dysfunction. Furthermore because of communication difficulties many of them are unable to indicate when they are hungry and unable to request food or drink.

Not many studies are available in India to know the incidence of malnutrition in children with intellectual disability. Hence the present study has been designed with an objective to assess the nutritional status of children with intellectual disability of 3-10-year age group.

## METHODS

Hospital based descriptive study. One and half year - from January 2017 to June 2018. Children with intellectual disability of 3 years to 10 years age group brought to child psychiatry OPD during the study period were enrolled in the study. The study was conducted in Government Medical College, Nizamabad which is a teaching hospital.

### Inclusion criteria

- Children with intellectual disability of IQ less than 70 of 3-10-year age group were included in the

study. Children of 2-3-year age who are not on breast feeds were also included in the study.

### Exclusion criteria

- Children with seizure disorder who were on valparin.
- Children with any acute illness like respiratory or gastrointestinal infections.
- Children with underlying chronic pulmonary, cardiac or renal diseases.

### Procedure

A predesigned proforma was used to record the details of enrolled children. Age of the child was recorded in completed months. Socioeconomic status was assessed by modified Kuppaswamy scale.<sup>8</sup> Height of all subjects was recorded to the nearest 1.0 mm by using a mobile stadiometer. Body weight was measured in light clothing to the nearest 0.1 kg with an electronic scale. BMI was calculated by dividing body weight (in kg) by height<sup>2</sup> (in m). The Body Mass Indices were plotted on the BMI for age percentile charts. The subjects were divided into mild, moderate, severe, profound MR by a child psychiatrist and a psychologist based on their IQ/DQ. Children with IQ/DQ 55-69, 40-54, 21-39, less than 20 were graded as mild, moderate, severe, profound MR respectively. The parents of the subjects were explained the purpose of the study. The child's daily diet consumption was recorded by a 24-hour recall method and food frequency method. They were shown sample household measures (standard glass, cup, bowl, cooking ladle, serving spoon, tablespoon and teaspoon) and were asked to tell how much quantity of food the child consumed in the last 24 hours. An experienced Nutritionist, NIN based estimated the mean energy, protein, fat, calcium, iron, zinc, vitamin B1, vitamin B2, B3, B6 and folic acid intake of subjects. The RDA for Indian children was used to calculate the percent difference in consumption of above nutrients. The feeding behaviour and problems were asked by a pre-designed questionnaire formulated by child psychiatrist and nutritionist.

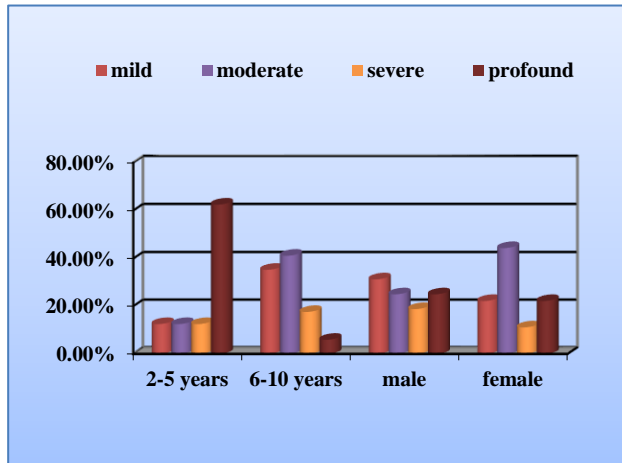
### Statistical methods

Data was recorded on pre-designed proforma and managed on a Microsoft Excel 2010 spread sheet. All the entries were double checked for any possible keyboard error. Group comparisons were done by applying t-test (quantitative data) and  $\chi^2$  test (qualitative data). Product moment correlation was used to examine the correlation between level of retardation and nutrient intake and feeding problems. P value less than 0.05 was taken as significant.

## RESULTS

A total of 100 children were enrolled in the present study. Out of 100 children with intellectual disabilities 32% of

children were 2-5 years and 68% of children were 6-10 years. More number of children with profound (62.5%) and severe (12.5%) intellectual disabilities were 2-5 years compared to children with mild (12.5%) and moderate (12.5%) intellectual disabilities. More number of children with mild (35.3%) and moderate (41.2%) were 6-10 years compared to children with severe (17.6%) and profound (5.9%) intellectual disability. As  $p$  value  $<0.05$ , this difference was statistically significant. Gender distribution showed that disability 64(64%) children were males and 36(36%) children were females (Figure 1).



**Figure 1: Demographic profile vs grades of intellectual disability.**

68(68%) children belong to upper lower socioeconomic status, 28(28%) children belong to lower middle status, and 4(4%) belong to upper middle socioeconomic status. More number of children with mild (35.3%) and moderate (35.3%) intellectual disabilities belong to upper lower class compared to children with severe (11.8%) and profound intellectual disabilities (17.6%). More number of children with profound (42.9%) and severe (28.6%) intellectual disability belong to lower middle class.

All children upper middle class had mild intellectual disability. As  $p$  value  $<0.05$ , this difference was statistically significant.

Out of 100 children with intellectual disability 64% of children were thin with a BMI  $<5$ th percentile and 36% of children were normal BMI falling in the range of 5th-85th percentile.

More number of children with mild (31.3%) and moderate (37.5%) intellectual disabilities were thin with a BMI  $<5$ th percentile compared to children with severe (6.2%) and profound intellectual disabilities (25%). More number of children with profound (22.2%) and severe intellectual disabilities (33.4%) were normal BMI compared to children with moderate (22.2%) and mild intellectual disabilities (22.2%). As  $p$  value  $<0.05$ , this difference was statistically significant (Table 1).

**Table 1: Body mass index in different grades of intellectual disability.**

BMI	Total no of children with MR	No of children with Mild MR	No of children with Moderate MR	No of children with Severe MR	No of children with Profound MR
$<5$ th percentile	64 (64%)	20 (31.3%)	24 (37.5%)	4 (6.2%)	16 (25%)
5-85th percentile	36 (36%)	8 (22.2%)	8 (22.2%)	12 (33.4%)	8 (22.2%)
P value		0.005			

**Table 2: Daily intakes of children with mental disabilities and their adequacy in different age groups.**

Age	1-3 years		4-6 years		7-9 years	
	Mean	% of RDA	Mean	% of RDA	Mean	% of RDA
Calories (kcal)	874.16	82.4%	1273.22	94.3%	1420.25	84.03%
Proteins (gm)	24.08	144%	33.79	145%	42.88	145%
Fat (gm)	12.113	44%	22.65	61.6%	28.48	61.6%

In the present study, energy intake was low in all age groups of children with intellectual disabilities. It was lower in children of 1-3 years (82.4%) and 7-9 years (84.03%) age group compared to children of 4-6 years (94.3%) age group. In the present study, protein intake was adequate in all age groups of children with intellectual disabilities and also comparable in all age

groups. In the present study, fat intake was low in all age groups of children with intellectual disabilities. It was lower in children of 1-3 years (44%) age group compared to children of 4-6 years (61.6%) and 7-9 years (61.6%) age group (Table 2). In the present study, calcium intake was low in all age groups of children with intellectual disabilities. It was lower in children of 1-3 years (56%)

age group compared to children of 4-6 years (82.6%) and 7-9 years (82.6%) age group. In the present study, Iron intake was low in all age groups of children with intellectual disabilities. It was lower in children of 1-3 years (63.3%) age group compared to children of 4-6 years (75.5%) and 7-9 years (75.5%) age group. In the

present study, zinc intake was low in all age groups of children with intellectual disabilities. It was lower in children of 1-3 years (55.6%) age group compared to children of 4-6 years (62.5%) and 7-9 years (62.5%) age group (Table 3).

**Table 3: Daily intakes (minerals) of children with mental disabilities and their adequacy in different age groups.**

Age	1-3 years		4-6 years		7-9 years	
	Mean	% of RDA	Mean	% of RDA	Mean	% of RDA
Calcium (mg)	337.13	56%	488.5	82.6%	495.8	82.6%
Iron (mg)	5.7	63.3%	8.65	75.5%	12.09	75.5%
Zinc (mg)	2.78	55.6%	3.09	62.5%	5.005	62.5%

**Table 4: Daily intakes (vitamins) of children with mental disabilities and their adequacy in different age groups.**

Age	1-3 years		4-6 years		7-9 years	
	Mean	% of RDA	Mean	% of RDA	Mean	% of RDA
Vitamin B1 (mg)	0.96	190%	0.63	119%	0.955	119%
Vitamin B2 (mg)	0.118	31%	0.42	69.3%	0.555	69.3%
Vitamin B3 (mg)	5.54	69%	6.55	76.15%	9.90	76.15%
Vitamin B6 (mg)	0.417	46.3%	0.43	48.15%	0.77	48.12%

In the present study, vitamin B1 intake was adequate in all age groups of children with intellectual disabilities and also comparable in all age groups. In the present study, vitamin B2 intake was low in all age groups of children with intellectual disabilities. It was lower in children of 1-3 years (31%) age group compared to children of 4-6 years (69.3%) and 7-9 years (69.3%) age group. In the present study, vitamin B3 intake was low in all age groups of children with intellectual disabilities. It was lower in children of 1-3 years (69%) age group compared to children of 4-6 years (76.15%) and 7-9 years (76.15%) age group. In the present study, vitamin B6 intake was low in all age groups of children with intellectual disabilities and was comparable (Table 4).

## DISCUSSION

In the present study 100 children with intellectual disability were enrolled. They were divided into mild, moderate, severe, profound disability groups based on their IQ/DQ. Their nutritional status was assessed by BMI, daily intake of energy, protein, fat, calcium, iron, zinc, vitamins B1, B2, B3 and B6 based on 24-hour recall method. Presence of any feeding difficulties was noted by a pre-formed questionnaire.

Out of 100 children with intellectual disability 28% of children have mild intellectual disability, 32% have moderate disability, 16% have severe disability and 24% of children have profound intellectual disability. Similar findings were seen in Manju Mathur et al., study 37%

were mildly retarded, 39% moderately retarded, 22% severely retarded and 2% were profoundly retarded.<sup>10</sup>

**Table 5: Nutrient consumption of mentally retarded children (7-9 years) in various studies.**

Nutrients	Present study	Mathur M et al <sup>10</sup>	Maity A et al <sup>11</sup>
Energy (kcal)	1420.3	1821.7	1234.2
Protein (gm)	42.9	48.5	41.3
Fat (gm)	28.5	66.9	33.1
Calcium (mg)	495.8	825.0	-
Iron (mg)	12.1	11.1	-
Vitamin B1 (mg)	0.96	1.9	1.0
Vitamin B2 (mg)	0.56	0.9	-

## Body mass index

In the present study, 64% of children with intellectual disability were thin with a BMI less than 5th percentile. 36% of children with intellectual disability had BMI between 5th-85th percentile. Most of the children with intellectual disability had BMI less than 5th percentile. This percentage of thin individuals was high when compared with Manju Mathur et al, study and Nogay NH study.<sup>10,12</sup> Manju Mathur et al, and Nogay NH found that prevalence of thin individuals in mentally disabled children was 40% and 14.3%.<sup>10,12</sup> More number of children with mild (31.3%) and moderate (37.5%) intellectual disabilities were thin with a BMI <5th percentile compared to children with severe (6.2%) and profound intellectual disabilities (25%). More number of

children with profound (22.2%) and severe intellectual disabilities (33.4%) were normal BMI compared to children with moderate (22.2%) and mild intellectual disabilities (22.2%). As p value <0.05, this difference was statistically significant.

This study shows that more no of children with mild and moderate intellectual disabilities were thin when compared to children with severe and profound intellectual disability, which was statistically significant.

## CONCLUSION

In the present study, more number of children with intellectual disability were consuming less energy, fat, calcium, iron, zinc, B2 and B6 from their diet. Regular assessment of nutritional status of intellectually disabled children may be of value in correcting nutrient deficiencies promptly, as nutrient intake has a bearing on the growth, development and stature of an individual. Hence early detection and nutritional intervention prevents malnutrition and increases the quality of life in children with intellectual disabilities.

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