

Nutritional Profile of Intellectually Disabled Children Attending Special School

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Abstract: *Nutritional* status is of paramount importance for the intellectually disabled children attending special school. Poor nutritional status may have a devastating effect not only on the health but also on the education and scholastic achievements. The aim of the study is to assess the nutritional status of the intellectually disabled children in terms of the physical and biochemical parameters. A cross sectional study was conducted on 338 intellectually disabled children aged 9-16 years attending special school located in an urban area. Among the total samples of 338, 227 children were boys and 111 were girls. The physical parameters height, weight for age and body mass index was determined. Blood hemoglobin concentration was estimated. Head to foot assessment was also carried out to find the clinical signs and symptoms of any nutritional deficiencies. The results revealed that, the mean height of 46.7% (106) boys and 56.8% (63) girls were below the ICMR standard. The weight of boys and girls below ICMR standard were 78% (177 boys) and 67.6% (75 girls) respectively. Among the subjects studied 58% percent of the children were found to be underweight. Overweight, obesity and normal body mass index was observed in 6.8%, 5.6% and 29.6% respectively. Significant difference was observed in BMI when compared with age and gender. The mean haemoglobin level was less than the standard in both boys and girls. Among the clinical signs observed 51.5% of the children had dental caries followed by 50.9% dermatosis, 43.8% pale eyelids, 41.1% follicular hyper keratosis, 30.2 % sore tongue, 22% bleeding gums and 21% spoon shaped nails. The prevalence of anaemia was more among the disabled children. A decline in the anthropometric parameters was observed in the children and the results clearly indicated a poor nutritional status among the disabled children. Thus the study has proved that, the prevalence of malnutrition was high among intellectually disabled children and adequate nutritional support can definitely enhance their quality of life.

Key Words - Intellectual disability, Nutrition status, Anaemia, Special school.

INTRODUCTION

Intellectually disabled also known as mental retardation (MR) is characterized by significant limitations in both intellectual functioning and in adaptive behaviour, which covers everyday social and practical skills. This disability originates before the age 18 years. It is a condition of arrested or incomplete development of the mind, characterized by impairment of skills (cognitive, language, motor and social) manifested during the developmental period, which contribute to overall level of intelligence. People with disabilities often need extra help to attain and preserve good health (Narasimha Reddi *et al.*, 2014).

Nearly 83 million of the world's population is estimated to be mentally challenged, with 41 million having long-term or permanent disability. It ranks fourth in the list of leading causes of disability.

In India, out of the 121 crore population, about 2.68 crore persons are 'disabled' which is 2.21% of the total population. With a score of 70 as the IQ limit, about 1% of population is estimated to have intellectually disabled (Gillberg *et al.*, 2003). Physical or mental disability was observed in 1.6% of the population in Tamil Nadu (www.mospi.gov.in).

The overall prevalence of mentally challenged children is between 1-3%. Population studies have shown that overall prevalence of mild to severe mentally challenged ranges from 2.5 to 5 per thousand. It is more common in developing countries because of the higher incidence of injuries and anoxia around birth, early childhood brain infections and malnutrition (Nadeem Ahmad, 2009). Mental development is affected by the following nutritional conditions: low birth weight, mild, moderate, and severe protein-energy malnutrition, iodine deficiency, and iron deficiency (Fernald, 1997).

Nutrition is one of the key components in reducing the risk for malnutrition which may impair the mental development, mood alteration, behaviour, and physical health. It has been found that nutrition is important all throughout the lifespan of an individual especially it has a tremendous impact during early childhood (Tapsell, 2007).

The brain is undergoing a major growth spurt during this time period, thus increasing the body's demand for nutrients. Children require a nutritionally balanced diet in order to meet the demands of their growing brain. Without the necessary intake of nutrients the brain will be stunted in its growth, which may possibly lead to mental impairment or retardation (Benton, 2008).

A remarkable number of students with intellectual disability attend special school every year. Disabled children are more vulnerable for nutritional problems like under-nutrition or anaemia due to inadequate nutrient intake either due to feeding problems or poor feeding knowledge among care providers. These problems can interfere with education and scholastic achievements. It can lead to school dropout and minimize opportunities to participate in the labor force. In an era where 'inclusive development' is being emphasized as the right path towards sustainable development, focused initiatives for the welfare of disabled persons are essential (www.mospi.gov.in).

Hence, knowledge regarding the effects of nutritional factors in the intellectually disabled persons is required to formulate appropriate interventional policies. However, in India, there is a lack of sufficient number of studies on intellectually disabled subjects attending school. Thus this study aims at evaluating the nutritional profile of intellectually disabled children attending school. The objective of this study is to assess the nutritional status of mentally disabled children on the basis of anthropometric and some biochemical parameters in order to develop nutritional strategy directed towards prevention and management of malnutrition and general wellbeing of intellectually disabled children attending school.

MATERIALS AND METHODS

A cross sectional study was carried out on 338 (227 males 111 females) intellectually disabled children aged 9-16 years attending special schools. The subjects were divided into four age groups (9-10years, 11-12 years, 13-14years and 15-16 years) and were selected from six schools located in the urban areas of Madurai city.

I) Anthropometric Parameters:

Anthropometric parameters such as height, weight and BMI were measured using standardized methods.

Weight: Subjects were weighed with light clothes and bare footed using platform bath scale. The weight was measured to the nearest 0.1kg (WHO, 1983).

Height: A vertical scale fixed to the wall was employed to measure the height of the subjects. After removing the shoes, the children were instructed to stand on flat platform, feet parallel and with heels, shoulders and back of head touching the upright and the head in frank fort position. Height was recorded to the nearest 0.5 cm.

BMI: BMI is determined using the mathematical calculation of weight in kilograms divided by the square of the height in meter. $BMI = \text{Weight (Kg)} / \text{Height}^2 \text{ (m)}$. It is interpreted by using the international classification recommended by WHO is BMI <18.5 is Under weight, BMI 18.5 -24.5 is Healthy weight range, BMI 25-30 is Over weight (Grade obesity), BMI >30-40 is Obese (Grade 2 obesity), BMI >40 is Very obese (Morbid grade 3 obesity) (Jegadeesh Ramasamy *et al.*, 2014).

II) Biochemical Assessment

Bio chemical analysis of serum hemoglobin estimation was carried out for all the subjects by a clinical laboratory technician. Serum hemoglobin level was estimated by using the Drabkin's method. Cut off points for hemoglobin was < 12g/dl (WHO, 1995).

III) Clinical Examination

Clinical examination is the simplest and most practical method of ascertaining the nutritional status of a group of individuals. The clinical signs and symptoms were investigated for intellectual disability children from head to foot, to find out the nutritional deficiency by a physician.

IV) Statistical Analysis

The collected data was analysed statistically using Statistical Package for Social Sciences Version 16.0 for Windows. Chi-Squared test (X²) was used to determine significant differences between the categorical variables (P<0.05).

RESULTS AND DISCUSSION

Table-1
Distribution of the Studied Subjects by Age and Gender(n=338)

Variables		Number	Percentage
Age	9 to 10	86	25.5
	11 To 12	97	28.7
	13 To 14	103	30.5
	15 – 16	52	15.4
Gender	Male	227	67.2
	Female	111	32.8

Table- 1 shows the distribution of the studied subjects by age and sex. The total sample included in the study was 338 intellectually disabled children. They were classified into four age groups; (9-10 years 25.5%, 11-12 years 28.7%, 13-14 years 30.5% and 15-16 years 15.4%.

The percentage of males in the study was 67.2% and female was 32.8%. The same result was observed in the study carried out by Subrata Naskar and Kamal Nath (2016) where the percentage of male subjects was high than female.

Table-2
Mean Height of Boys and Girls Based on Age

Age in Years	Boys			Girls		
	Number	ICMR Std.	Mean Height ±SD	Number	ICMR Std.	Mean Height ± SD
9	19	132.2	130.6 ±6.02	9	132.2	130.0 ±2.63
10	31	137.5	135.1 ±17.98	27	138.3	136.4 ±10.07
11	10	140.0	138.5 ±3.16	9	142.0	141.6 ±5.27
12	60	147.0	148.9 ±9.12	18	148.0	147.7 ±8.84
13	29	153.0	154.0 ±12.40	5	150.0	153.0 ±0.00
14	46	160.0	157.3 ±14.77	23	155.0	157.4 ±10.04
15	22	166.0	168.1 ±11.10	5	161.0	163.0 ±0.00
16	10	171.0	174.5 ±7.37	15	162.0	163.0 ±16.32

Table 2 depicts the mean height of the studied subjects according to age group and gender. The mean values of height was less than the ICMR standard among boys in the age group of 9,10,11 and 14 years of age and the mean value of height was higher in 12,13,15 and 16 years of age. In girls the mean values of height was less than the ICMR standard in the age group of 9,10,11 and 12 years of age and was higher in 13,14,15 and 16 years of age. This result coincides with the study result of

Srivastava et al; (2012) where they reported that the mean height of girls was lower than that of the boys in all age groups except the age group 13-14 years.

Table-3
Mean Weight of Boys and Girls Based on Age

Age in Years	Boys			Girls		
	Number	ICMR Std.	Mean Weight \pm SD	Number	ICMR Std.	Mean Weight \pm SD
9	19	28.1	29.4 \pm 1.05	9	28.5	28.1 \pm 1.05
10	31	31.4	37.6 \pm 13.19	27	32.5	35.2 \pm 14.5
11	10	32.2	31.2 \pm 4.91	9	33.7	25.2 \pm 2.10
12	60	37.0	34.9 \pm 8.97	18	38.7	35.2 \pm 2.18
13	29	40.9	39.6 \pm 8.05	5	44.0	40.0 \pm .00
14	46	47.0	45.9 \pm 20.00	23	48.0	46.4 \pm 13.91
15	22	58.0	52.5 \pm 11.20	5	51.5	47.0 \pm 0.00
16	10	52.6	52.0 \pm 4.91	15	53.0	45.0 \pm 5.91

Table- 3 represents the mean weight of the studied subjects according to age group and gender. The mean values of weight was less than the ICMR standard among boys and girls in all the age groups except in the age groups 9 and 10 years of age in boys and 10 years in girls. When compared among the gender the mean weight was less in girls than boys

Table-4
Age Wise Distribution of the Subjects According to Nutritional Status

Age	NUTRITIONAL STATUS					X ²	P value
	Normal (n=100)	Under weight(n=196)	Overweight (n=23)	Obese (n=19)	Total (n=338)		
	No (%)	No (%)	No (%)	No (%)	No (%)		
9-10	36(41.9%)	31(36%)	14(16.3%)	5(5.8%)	86(100%)	71.254,12	.000*
11-12	10(10.3%)	73(75%)	4(4.1%)	10(10.3%)	97(100%)		
13-14	29(28.2%)	70(68%)	0(0%)	4(3.9%)	103(100%)		
15-16	25(48.1%)	22(6.5%)	5(9.6%)	0(0%)	52(100%)		

* Significant P<0.05

Table- 4 shows the age wise distribution of the subjects according to the nutritional status. The prevalence of underweight was more among the studied subjects (196 subjects out of the total population 338). The percentage of underweight was more in the age group 11-12 years (75 %) followed by 68%, 36% and 6.5% in the age groups 13-14, 9-10 and 15-16 years respectively.

Prevalence of overweight and obese was high in the age groups 9-10 (5.8%) and 11-12(10.3%) years. Number of normal subjects was more in 15-16 years of age. Statistically there was significant difference (P<0.05) between age groups. Mathur M et al (2007) concluded that underweight was more prevalent in mental retardation compared to normal subjects. This result confirmed the results of the present study as the number of subjects undernourished was 196(57.9 %) among the total number of (338) subjects studied.

Table-5
Gender Wise Distribution of the Subjects According to Nutritional Status

Gender	NUTRITIONAL STATUS					X ²	P value
	Normal (n=100)	Under weight (n=196)	Overweight (n=23)	Obese (n=19)	Total (n=338)		
	No (%)	No (%)	No (%)	No (%)	No (%)		
Boys	52(22.9%)	146(64.3%)	15(6.6%)	14(6.2%)	227(100%)	16.244,4	.003*
Girls	48(43.2%)	50(45%)	8(7.2%)	5(4.5%)	111(100%)		

* Significant P<0.05

Table- 5 shows the gender wise distribution of the subjects according to the nutritional status. The percentage of boys and girls who were undernourished was 64.3 and 45. Obesity was prevalent in 6.2% boys and 4.5 % in girls. Statistical analysis proved that there was a significant difference (P<0.05) between the gender in terms of the subjects' nutritional status. The results of the prevalence of obesity coincides with the results of Nalan HakimeNogay (2013) where the prevalence of obesity was found to be high in boys and contradicted in the study by Shabayek (2004) where obesity was more in girls.

Table-6
Prevalence of Anaemia among Children

Parameters	Boys (n = 227)		Girls (n = 111)		Total (n = 338)	
	No	Percentage	No	Percentage	No	Percentage
Anaemic	135	59.5	53	47.7	188	55.6
Non Anaemic	92	40.5	58	52.2	150	44.4

Table- 6 represents the prevalence of iron deficiency anemia. Haemoglobin estimation revealed that among the studied population, 44.4 % of the subjects had anaemia. It was more prevalent in girls (52.2%) than in boys (40.5 %). Nutritional anaemia was widely prevalent (51.5%) among the urban school children in a study reported by Verma M et al (1998) and the same result was observed in the present study as the prevalence of anaemic subjects was 55.6 %. The high prevalence of iron deficiency anemia among mentally disabled children was also reported by Abdallah AM et al. (2007) & Raut PK et al. (2018).

Table-7
Clinical Signs of Nutritional Deficiencies

*Clinical Signs	Boys(n=227) No (%)	Girls(n=111) No (%)	Total (338) No (%)
Sore Tongue and Mouth			
Present	66(29.1%)	36(32.4%)	102 (30.2%)
Absent	161(70.9%)	75 (67.6%)	236 (69.8%)
Pale Eyelid			
Present	90 (39.6%)	58 (52.3%)	148 (43.8%)
Absent	137 (60.4%)	53 (47.7%)	190 (56.2%)
Spoon Shaped Nails			
Present	47 (20.7%)	24(21.6%)	71 (21.0%)
Absent	180(79.3%)	87 (78.4%)	267 (79.0%)
Dermatosis			
Present	100 (44.1%)	72 (64.9%)	172 (50.9%)
Absent	127 (55.9%)	39 (35.1%)	166 (49.1%)
Follicular Hyperkeratosis			
Present	87 (38.3%)	52 (46.8%)	139 (41.1%)
Absent	140 (61.7%)	59 (53.2%)	199 (58.9%)
Swelling & Bleeding of Gums			
Present	43 (18.9%)	32 (28.8%)	75 (22.2%)
Absent	184 (81.1%)	79 (71.2%)	263 (77.8%)
Dental Caries			
Present	102 (44.9%)	72 (64.9%)	174 (51.5%)
Absent	125 (55.1%)	39 (35.1%)	164 (48.5%)

*Multiple Responses

Table- 7 presents the signs and symptoms of nutritional deficiency diseases in the studied population. The signs dermatosis (50.9%) and Dental caries (51.5%) were higher in the subjects followed by Pale eyelid (43.8%), Follicular hyperkeratosis (41.1%), Sore tongue and bleeding gums (30.2%) and Spoon shaped nails (21.0%). In boys and girls, the signs and symptoms Dental carries, Dermatitis, Pale eyelid and Follicular keratosis were more prevalent. Similar signs and symptoms were noted in the study carried out by Shivaprakash N C and Ranjit Baby Joseph (2014).

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