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An Evaluation of the Association between Dietary Habits and Nutritional Status in Special Children

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Abstract-*Epidemiological survey was conducted to assess association between dietary habits and nutritional status in special children. Sample size of 100 special children and 53 parents from Mangala Jyothi Integrated School, Mangalore; selected for this study. Self-administered questionnaire was used to collect data such as demographics, dietary habits and physical activity of children from parents. Height, weight and BMI of children was measured. Oral hygiene instructions provided for the attendees. More than 40% of children had roti and rice once a day, while less than 10% had sprouts and dry fruits daily. Eggs and meat were consumed on a weekly (40.4%) or biweekly (30.8%) basis by the children. Only 25% had fruits while 60% reporting to have vegetables on a daily basis. Around 42% of children had adequate physical activity, around 5-6 days a week. However more than 10% showed no or minimal physical activity. To conclude, on the basis of our study, it can be reported that special children may be underweight despite a relatively normal diet. Hence, a generalized approach that associates children with special needs and obesity cannot be applied in all situations, thus highlighting importance of an individualized treatment plan in this population.*

Keywords: *Special Children; Nutrition; Diet; Underweight; BMI*

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I. Introduction

The U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau (MCHB) defines children with special health care needs (CSHCN) as:

"...those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally." [1]

According to the Indian Census, 2011, the total number of disabled population in India is 26,810,557. This number has shown a 22.4% increase from the previous census in 2001, thus showing that the burden of disability is increasing. Out of this, 4.5% of the population is below the age of 20.[3]

There has been a world-wide increase in the prevalence of obesity among the general paediatric population. The International Association for the Study of Obesity (IASO) and International Obesity Task Force (IOTF) estimate that 200 million school children are either overweight or obese. [4]

In individuals with disabilities, feeding and mealtime behaviour problems like food refusal, food selectivity, mealtime aggression, rumination, pica and insufficient feeding skills are commonly observed,which alter their nutritional intake. [2]

Bandini et alreported a significantly higher rate of overweight for youth aged 6 to 17 years with mobility limitations compared with those without mobility limitations (28% vs 15% in girls and 31% vs 17% in boys)[5]. Furthermore, these adolescents had relatively unhealthy eating habits and were not physically active enough.

Children with disabilities often have one or more predisposing factors for obesity[22]. These include the coexistence of certain genetic syndromes known to be associated with obesity, reduced levels of physical activity, and the use of centrally acting medications such as anti-epileptics (e.g., sodium valproate) or anti-psychotics (e.g., risperidone) that can cause weight gain. The presence of obesity in children with disabilities may add to their existing and often complex medical needs. Excess weight may also make their care difficult from the carer's perspective, complicate their equipment needs, and have resource implications in terms of health care delivery and training of health personnel.[6]

Obesity in disabled children and adolescents is not only a risk factor for developing chronic diseases, but it also increases the risk of developing secondary conditions associated with the primary disability (ie mobility limitations, extreme levels of deconditioning, fatigue, pain, pressure sores, depression, and social isolation).Chronic and secondary conditions associated with obesity in adolescents with disabilities can undermine independence and limit opportunities for community engagement, leisure, and physical activities.Finally, obese children and adolescents are often stigmatized and bullied by others,which may further lowerself-esteem.[7] Although India leads the world in terms of the underweight population, the incidence of obesity is on the rise[15,16].Importantly, with 43 per cent of children underweight (with a weight deficit for their age) rates of child underweight in India are twice higher than the average figure in sub-Saharan Africa (22 per cent). The consequences of this nutrition crisis are enormous; in addition to being the attributable cause of one third to one half of child deaths, malnutrition causes stunted physical growth and cognitive development that lasts a lifetime[8].

A recent studyconducted among 24,000 school children in south Indiashowed that the proportion of overweight children increased from 4.94 per cent of the total students in 2003 to 6.57 per cent in 2005 demonstrating the time trend of this rapidly growing epidemic.[9]

Few Indian studies also suggest that the high socioeconomic group suffers more from obesity and not the low socioeconomic group of the society[17,18]. It has been noted that obesity depends not only on the volume of food ingested, but also on the composition and quality of the diet. Many studies have found an increase in the obesity levels in the adult as well as pediatric population. This has been attributed to the lifestyle changes and eating habits in the past few decades.[10] Therefore the aim of our study was to assess the association between the dietary habits and the nutritional status in a population of children with special healthcare needs.

II. Materials And Methods

An epidemiological survey was conducted to assess the association between dietary habits and nutritional status in special children. A sample size of 100 children with special healthcare needs and 53 parents from Mangala Jyothi Integrated School at Vamanjoor, Mangalore was selected for this study.

The inclusion criteria were:

- Physically or mentally challenged children, or those with sensory disabilities.
- Age between 2 to 12 years

The exclusion criteria were:

- Physically challenged children with lower limb disability who could not stand for height and weight measurement.
- Children who were un-cooperative and not willing to participate in the study.

Informed consent was taken from the school as well as the parents before the commencement of the study.

The study was conducted in two parts. The body mass index of the child was assessed, while the parents filled out a questionnaire form detailing the dietary habits of the child.

Anthropometry measurements:

1. The weight of each child was measured using a digital electronic weighing scale (in kilograms), with the patients wearing light clothing and without shoes.
2. The height was measured in centimeters, to the nearest 0.1cm, using a measuring tape.
3. The Body Mass Index was assessed as

$$\frac{\text{Weight (in kilograms)}}{\text{Height (in meters sq.)}}$$

The International ObesityTask Force (IOTF) cut-off points[24] were used to identify overweight and obesity rates

Underweight (<18.5)
Normal (18.5 – 25)
Moderately overweight (25-30)
Obese (>30)

Dietary Assessment:

The parents were asked to fill up a questionnaire that assessed the dietary habits of the children. This questionnaire was specially designedin a user friendly language for this study. It was a self-reported questionnaire with three major sections: 1. Demographics, 2. Frequency of intake of various food groups, 3. Frequency of physical activity. The results were tabulated and statistically analysed.

Statistical Analysis

The data was entered into Microsoft Excel and ANOVA and t- test were used to statistically analyze the data. $p < 0.05$ was considered significant.

III. Results

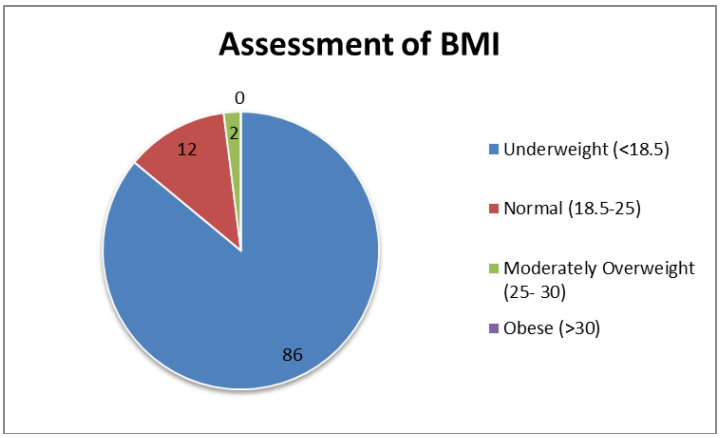
Anthropometric Measurements:

A total of 101 children, aged between 2 to 12 years, were assessed for their height and weight during the study.

Disability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	16	16.0	16.0	16.0
	2	29	29.0	29.0	45.0
	3	55	55.0	55.0	100.0
	Total	100	100.0	100.0	

51% of our study population was male, and 49% were females. According to disability, 55% of the children had a speech/hearing impairment, 29% were mentally handicapped and 16% had a physical handicap.



We found that the vast majority of children (86%) were grossly underweight with a BMI of less than 18.5. Less than 2% of the participants were overweight, and we did not have any obese child in our study. The BMI was not associated with the type of disability as assessed by ANOVA.

Descriptives

BMI

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	14	14.4914	2.05524	.54929	13.3048	15.6781	11.53	19.90
2	29	16.8193	4.85697	.90192	14.9718	18.6668	10.60	31.63
3	55	16.2209	3.66889	.49471	15.2291	17.2127	8.70	31.50
Total	98	16.1509	3.92468	.39645	15.3641	16.9378	8.70	31.63

ANOVA

BMI

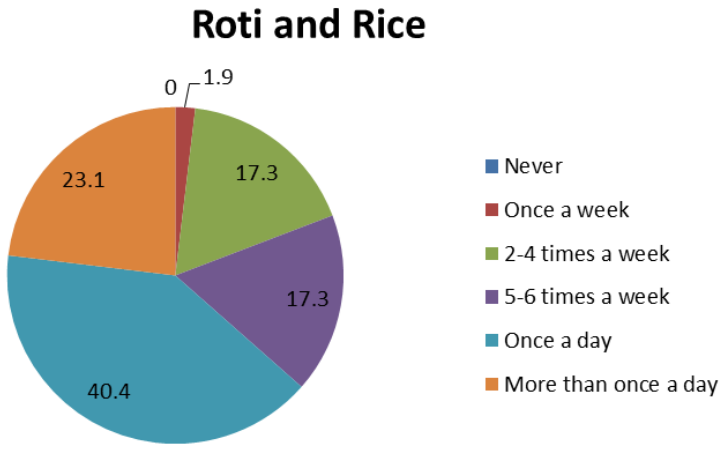
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	51.780	2	25.890	1.705	.187
Within Groups	1442.320	95	15.182		
Total	1494.100	97			

Questionnaire Results:

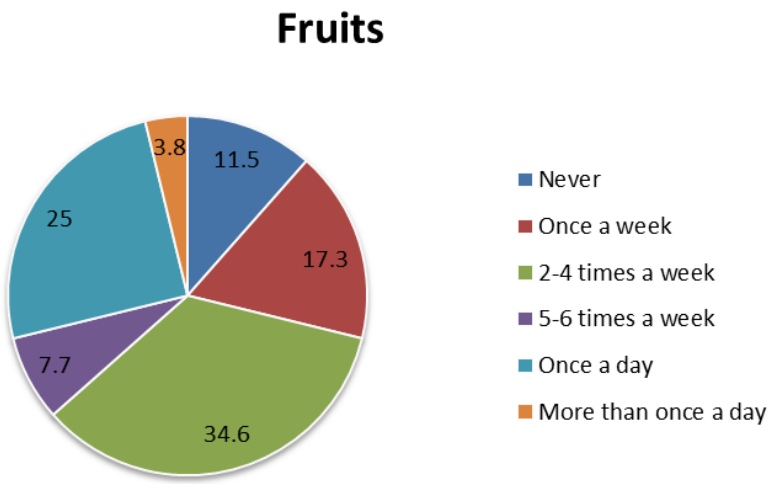
Out of the total parents who filled the questionnaires-

- 94.2% were females and 5.8% were male.
- 59.6% of the mothers were educated upto 10th standard and 67.3% were not working.
- 51.9% of the fathers were educated upto 10th standard and 58.8% were skilled workers.
- 74.5% of the families were nuclear and about 82.7% of them had a mixed diet.

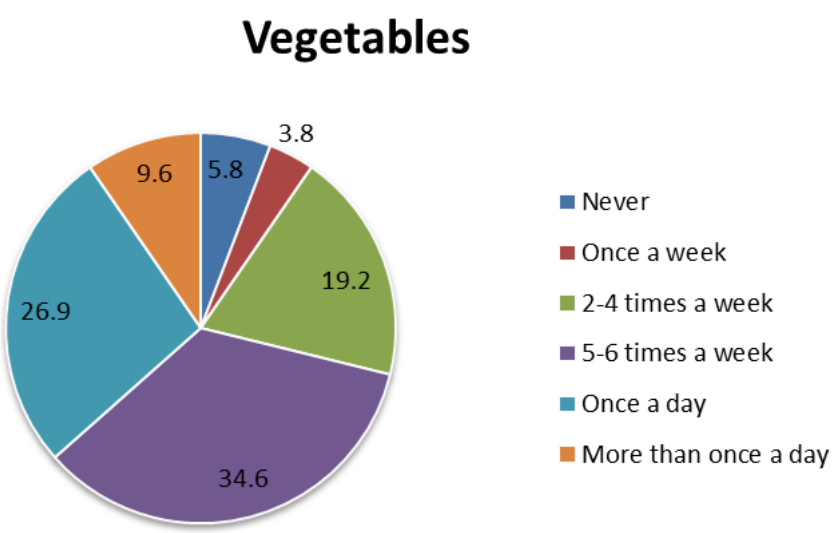
Most of the children evaluated did not follow a healthy diet and 86% were found to be underweight.



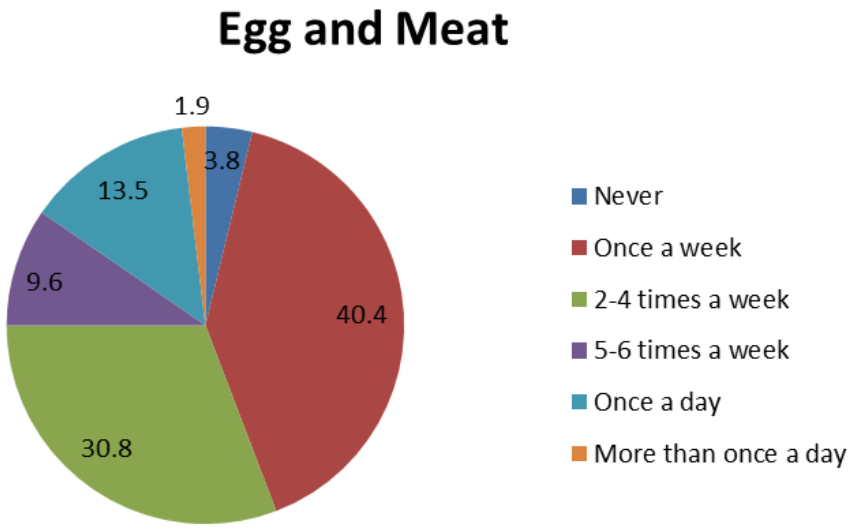
The majority of children (more than 40%) had carbohydrates in the form of roti and rice once a day.



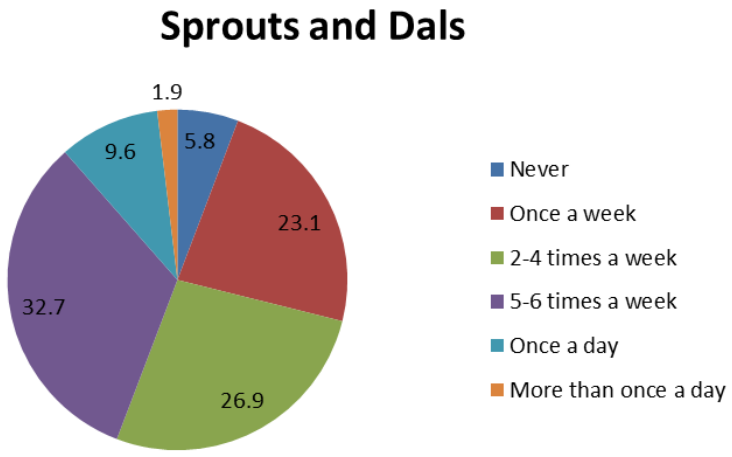
The intake of fruits was less, with only25% of the study population consuming fruits on a daily basis.



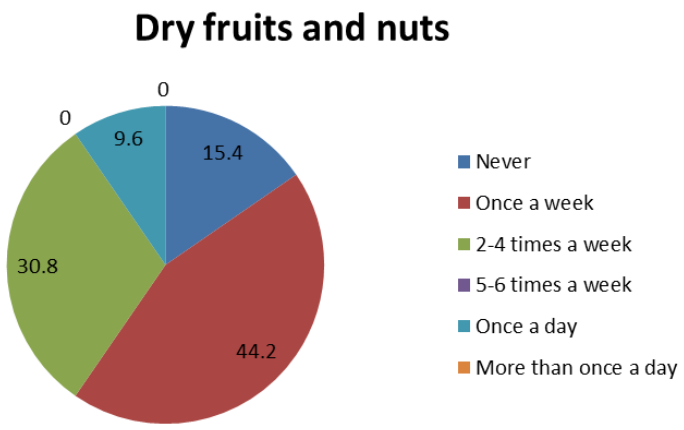
The vegetable intake was adequate with more than 60% reporting that they had vegetables almost daily.



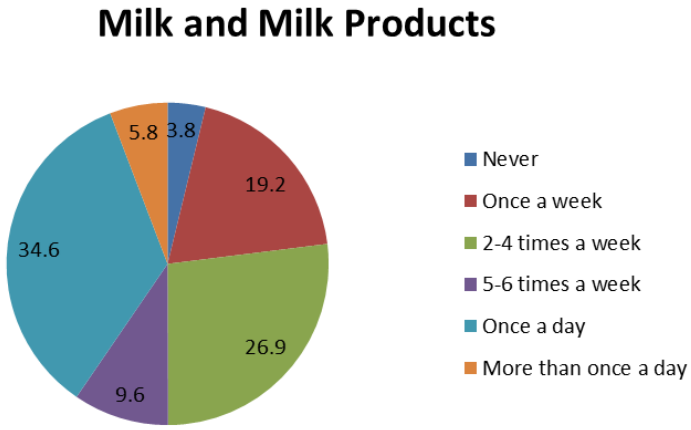
Eggs and meat were consumed on a weekly (40.4%) or biweekly (30.8%) basis by the children.



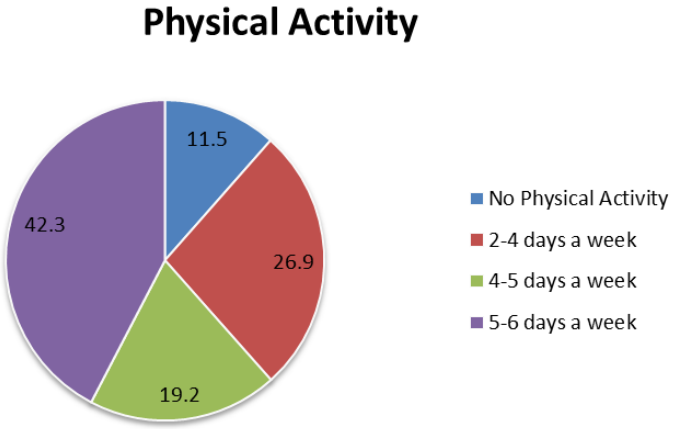
Less than 10% of the children had sprouts and dals on a daily basis.



Consumption of dry fruits and nuts was low, with 44.2% of the children having it only once a week, and more than 15% reporting that they never had it.



Milk and milk products were ingested daily by only 34.6% of the population.



Around 42% of the children had adequate physical activity, around 5-6 days a week. However more than 10% showed no or minimal physical activity.

IV. Discussion

The vast majority of published literature reports an association between individuals with special healthcare needs and the occurrence of obesity[5,12-14].Arecent tendency reported in the literature indicates an association between eating habits that are less healthy and the prevalence of obesity.[9]However, in our study, we found that the majority of children were underweight in spite of having relatively healthy eating habits[11]. This

may be attributed to the fact that our sample consisted primarily of families from the low socio-economic strata. Children from these families do not have much access to the high calorific, unhealthy foodstuff. Also, they usually do not have much choice regarding the food they eat. In this regard we found that as the sample group was from poor socioeconomic group, they tend to consume less quantities of food and vegetables whereas moderate intake of saturated and unsaturated fats[19-21,25]. This may have led to underfeeding and thus the underweight tendency that we found in these children.

The Asian population in general also tends to have a lower BMI as compared to the western world, irrespective of whether the general population or disabled individuals are studied. Thus, there have been suggestions to reduce the BMI cut offs for this population[23].

A study done in North Western India[2] found that more mentally challenged children were underweight, while more normal children were overweight. The children with mental handicap were significantly more likely to have difficulty in chewing and swallowing; and had the tendency to spit out and vomit food. The diets were deficient in iron and possibly riboflavin in 10-18 year old special children; and in iron in the normal group; however, a direct comparison of both groups revealed that mentally challenged subjects had significantly lower intake of most nutrients. Level of retardation was associated with self- feeding deficits.

A study on nutritional status in mentally retarded children (all subjects had Down's syndrome) from India showed that these children were shorter than normal children. Children in the age range of 4-9 years weighed less and had deficient calorie intake and those in the range of 10-16 years weighed more and had surplus calorie intake than normal children. Children in all age groups had insufficient intake of protein, and vitamins A, C, and B complex, and excessive intake of fat[2].

Previous studies have given a self- administered questionnaire that was answered by the children themselves[10]. However, in our study, the children were from varying age groups and had different types of disabilities. Hence to avoid the possibility of misunderstanding or miscommunication, the questionnaire about dietary preferences and habits was answered by the parents.

Limitations and future prospects:

Some children with disabilities may have a different body composition so that the BMI as applied elsewhere may not reflect the body fat proportion accurately in this group. One study has even reported that, in contrast to healthy children, BMI and body composition correlate only to a degree in disabled children. Thus more research is needed, detailing the exact nutritional deficiencies in children with special needs and means to overcome the same.

Recommendations based on our study:

- The frequency of intake of egg, meat, dry fruits ,sprouts and dal should be increased
- Children not involved in physical activity should be encouraged to do so.
- The parents and children should be educated about maintaining oral hygiene and the importance of a healthy diet.

V. Conclusion

To conclude, on the basis of our study, it can be reported that children with special health care needs may be underweight despite a relatively normal diet. Hence, a generalized approach that associates children with special needs and obesity cannot be applied in all situations, thus highlighting the importance of an individualized treatment plan in this population.

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