

Nutritional Status of Differently Abled Children in Coorg District, Karnataka - An Original Study

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Abstract

Background: Adequate nutrition is a fundamental prerequisite for good physical health, motor and cognitive development and social development. The nutritional status of the disabled may be often neglected because of the disability condition, a demanding disease or limited access to health care. All differently abled children are at high risk for under- and malnutrition. Malnutrition can potentially prone a disabled child to further morbidities thus imposing further suffering to the affected child and his/her family. To avoid the potential detrimental effects of malnutrition, it is important to take necessary actions in providing an optimal nutritional diet for differently abled children.¹

Objective: To assess the nutritional status of differently abled children in Coorg district, Karnataka based on anthropometric indicators and three-day dietary recordings.

Method: Descriptive cross-sectional study sample comprised of 129 differently abled children aged 6 years and above, of both sexes, attending three special centers in Coorg District were included. Anthropometrics assessment (Body mass index and body fat ratios) of the children were calculated by measuring their body weight, height, mid upper arm circumference and the skin fold thickness of their triceps and sub scapular. In order to determine their nutrient intake three-day nutrition consumption was recorded.

Results: Among all the 129 differently abled children assessed, gender distribution was found to be more in females and most prevalent medical condition was mental retardation (72 children), 46.51% of disability was observed in age group 0-13 years. 47% were with healthy BMI, 82% with healthy MUAC, in body fat assessment 14% were over fat, 22% were under fat and 64 % were having healthy body fat. From MUAC assessment 3.1% were severely acute malnourished and 14.73% were undernutrition and 35 children were found to be obese.

Conclusion: Systematic assessment of nutritional status of differently abled children may be of great worth in rectifying nutrient deficiencies promptly, since nutrient intake has a significant effect on the growth, development, and stature of an individual. Consequently early detection and nutritional intervention prevents malnutrition and increases the quality of life in differently abled children.

Keywords: Differently abled children, BMI, MUAC, Nutrition, Food group

Introduction: WHO has stated that differently abled is a person who has impairment that produces functional limitations, restrictions in activities or has social handicap?² Differently abled is a complex phenomenon which reflects an interaction between the features of person's body and the features of the society in which he or she lives. Individuals with disability are seen as being restricted in performing daily activities because of a complex

set of interrelating factors, some pertaining to the person and some to the environment and social/political arrangements.¹

Giulio and Philipov concluded that 1.9% incidence of a differently abled child, amongst all families.³ It was been reported stating that 10% to 20% of individuals have developmental disability.⁴ UNICEF has estimated about 93–150 million children live with disabilities. Of every four children with disabilities, three children reside in low-and middle-income countries (LMICs). 38% stunting, 21% wasting, and about 36% underweight rates were estimated in Indian children as per the latest survey conducted by the National Family Health Survey-4 (NFHS-4). The percentage of children in rural areas who were stunted was 41% which was much higher compared to urban areas, that is, 34%.⁵

In India with lack of awareness, lack of resources, lack of community-based services, babies born with abnormalities continue to live without attempts at proper diagnosis and possible therapies. This is much more with female babies especially in rural areas. Sometimes it goes beyond childhood to adulthood and years beyond.

Many children with disabilities have both general and oral health problems that can impact their nutritional well-being and eating habits. Adequate nutrition is a fundamental prerequisite for good physical health, motor and cognitive development and social development (Meeks Gardner J et al, 1990; Water- low JC, 1994). Malnourished children can become adults with lower physical and intellectual abilities, lower levels of productivity and higher levels of chronic illness and disability (UNICEF, 1998). Disabled people are often assumed to have poorer nutrition than their non-disabled counterparts. Surveys in developed countries have shown that disabled children and adolescents are vulnerable to poor nutritional care (Bax, 1993; Thomas et al, 1989). In contrast, far less information is available on the nutritional status of disabled children in developing countries where the situation is further complicated by widespread malnutrition among the general population. Previous studies in Nigeria (Alakija, 1988; Ojofeitimi, 1983) identified mild malnutrition in school-age children with sensory or mental impairments.

To understand the links between nutrition and disability (differently abled), a good data are required and a need for improved access to nutrition services for pregnant and breast-feeding mothers. Differently abled ones should be mainstreamed in all early intervention nutrition, health, and development efforts with oral health. To ensure effective and inclusive nutrition, special attention should be attended by nutritionists, health professionals, oral health care providers, paediatric dentists, and community service providers to include children at high risk of becoming malnourished.

A complete nutrition assessment in differently abled children includes several components like physical examination, medical record review, anthropometric measurements and diet/nutrition intake. The physical examination component of the nutrition assessment is more critical. The one intervention that may be utilized during the development screening is Anthropometric measurements which includes the assessment of body mass index (BMI), mid upper arm circumference (MUAC) and skin fold thickness (SKF).⁶

Based on the hypothesis that children with disabilities may not be following adequate nutrition practices.

On current literature revival it was observed that there are very limited Indian studies regarding nutritional assessment in differently abled children with respect to their diet practices and correlating their health status by taking anthropometric measurements. Nutritional consideration for differently abled children should be primary focus both from their overall health needs and to meet demands of the growth along with restrictions on cariogenic feeding with soft diet and sweetened food.

The present study was initiated to assess the diet practices and to correlate nutritional status from their diet practices by using anthropometric measurements in differently abled children of Coorg district in Karnataka.

Material and Methods: Kodagu, often known as Coorg, is a town in Karnataka state, India. Coorg, which is located on the Western Ghats, spans 4102 square kilometres, and is divided into five Taluks: Madikeri, Somwarpet, Ponnampet, Kushalnagar and Virajpet.(updated January 2021) There are 98 Grama Panchayaths and four Municipalities in the state. The overall population is 548561 people, with 473179 of them residing in rural regions.. According to the 2001 census of India, Coorg has 0.8 percent disabled individuals, which is higher than the rest of Karnataka.⁷

The present study was undertaken by the Department of Pedodontics and Preventive Dentistry, Coorg Institute of Dental Sciences, Virajpet. The study included 129 children aged 6 years and above, attending a specialized education and rehabilitation centres

Cheshire Homes India Coorg, Kodagu Vidyalaya Opportunity School, and Swastha Centre for Special Education and Rehabilitation.

Selection of Samples: All the children attending Cheshire home, Kodagu Vidyalaya Opportunity School and Swastha centre for Special Education and Rehabilitation in Coorg who were qualified for the study and who were present on the day of examination and willing to participate were included. Those who were not willing to participate were excluded. Official permissions from the respective heads of the three special schools and informed consent from the parent and care givers were obtained. Ethical clearance from the institution ethical committee of Coorg Institute of Dental Sciences was also obtained. CTRI trial registration number for this study is CTRI/2021/12/039046.

Procedure for Anthropometric Measurement for Assessment of Nutritional Status

1. BMI (Body Mass Index) in Differently abled children: Body mass index is a value derived from the mass and height of a person. Cole's LMS method was used in the present study which adjusts the body mass index distribution for differing degrees of skewness at different ages, hence considered as a reliable method for recording BMI of differently abled children. BMI calculator app downloaded from Google play app store designed according to WHO and DGO classification and easy to use.

The present study followed redefined body mass index categories in which the differently abled children which were grouped as follows; Underweight <18.5; Ideal 18.5-24.9; Pre-obese 25.0-29.9; Obese class I 30.0-34.9; Obese class II 35.0-39.9; and Obese class III >40 kg/.

Body weight was measured with a scale sensitive to ± 0.1 kg with thin clothing and no shoes, weight was assessed by tecsun digital weight machine, Height was taken by freeman's metal measuring tape; and age data was compiled. WHO approved BMI calculator app from play store app was used for easy calculation and categorizing them as Underweight, Normal, Overweight and obese. (FIG 1)

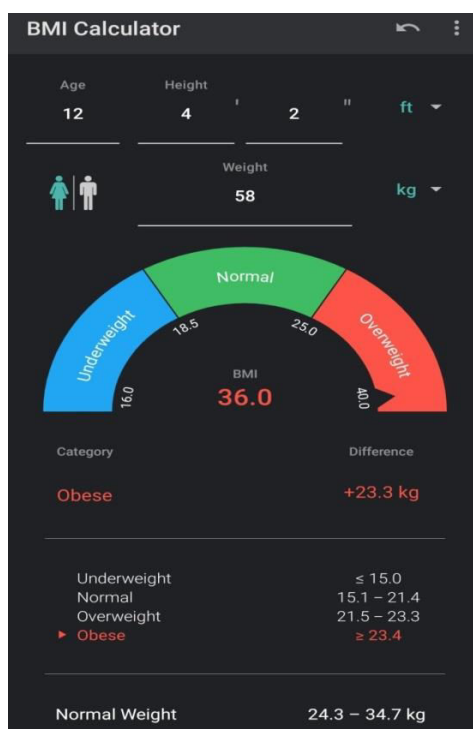


Figure 1: BMI Calculator App

2. Procedure to record MUAC (Mid upper arm circumference) in differently abled children: Mid upper arm circumference (MUAC) is a useful tool for a fast assessment of the nutritional status. (FIG 2). MUAC is the circumference of the right upper arm measured at the midpoint between the tip of the shoulder and the tip of the elbow (olecranon process and the acromion).⁹

MUAC cut-off for children under 6 years of age

Red: 0 – 11.5 cm - severe acute malnutrition (SAM)

Yellow: 11.5 cm - 12.5 cm- acute malnutrition/undernutrition

Green: from 12.5 cm- no - no acute malnutrition/normal.



Figure 2: MUAC tape

MUAC cut-off for adults and adolescent

MUAC tape without colour code/PAC-50 is to be used for adults. The tape is not colour coded, as there is no agreement yet on a universal colour code. Graduation is in millimetres and can be used for taking measurements of MUAC up to 50 cm.

>23 cm in males, >22 cm in females based on these cut-offs they are categorized as Normal, Undernutrition and Severe acute malnutrition (SAM)

3. Procedure for calculating skin folds thickness/body fat assessment: Skin fold thickness is an important and valid anthropometric indicator of the amount of subcutaneous fat tissue and regional fatness.

Skin fold measurements with digital skin fold calliper

The most used skin fold test is the Durnin & Womersley four site test, this test uses the sum of the triceps, biceps, sub scapular and supra iliac skin folds to produce an estimate of body fat

For males and females

Most important step to follow is to firmly grasp a skin fold of differently abled children, between our thumb and index finger and lift this up.⁹ The skin fold should include two thicknesses: one of skin and one of the subcutaneous fats, but no muscle or fascia. Then place the contact surface of the callipers (FIG 3) at a 90-degree angle to the skin fold approximately 1cm below the fingers. Slightly release the pressure between the fingers but remain holding the skin fold so that a greater pressure is applied by the callipers. Release the handle of the callipers and read the needle to the nearest 0.1mm approximately 4 seconds after the pressure is released and now take down the data.¹⁰

After taking skin fold measurements from Biceps, triceps, sub scapular and supra iliac region, the readings subjected to estimation of body fat content by using plixi fat calculator available in Google play store (FIG 4), which gives the percentage of body fat (FIG 5) in differently abled children and based on the body fat chart comparison nutritional status of the differently abled children were categorized as Under fat, below Average, Healthy, average Overfat and obese.



Figure 3: Digital calliper

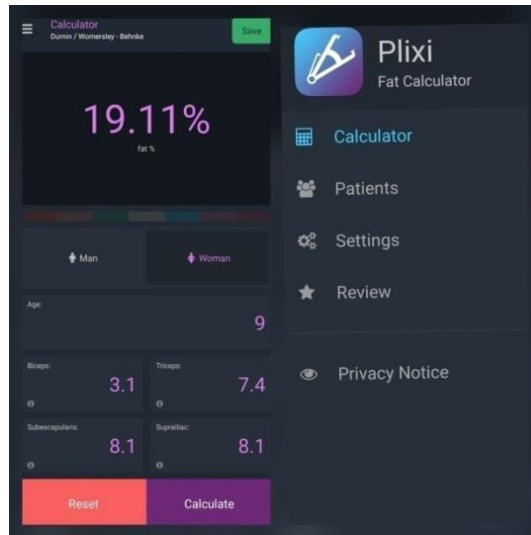
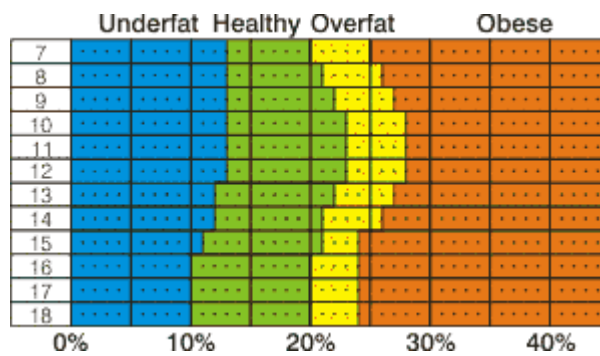
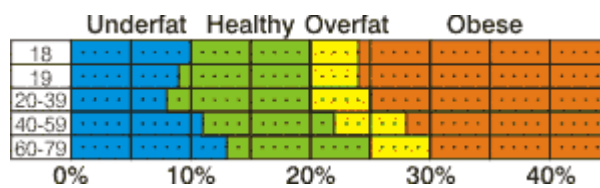


Figure 4: PLIXI app for body fat percentage calculation

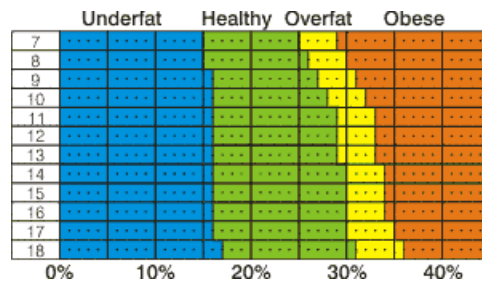
**Body Fat Percentage Chart
 Male 7-18**



Male 18-79



Female 7-18



Female 18-79

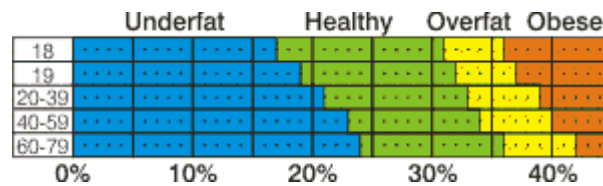


Figure 5

Procedure for Nutritional Assessment

1. Procedure for recording the diet chart: A 3-day diet history chart was designed to evaluate the food groups in the diet and assess average diet for a day.¹¹ All the children who participated in the survey were invited to complete the diet chart and it was sent to home for the caregivers to fill the data. The caregivers of each school were trained by the examiner to fill the diet chart and explain to the parent about the data entry. It included date, type of food vegetable/fruit group, bread cereal group, milk cheese group, meat and poultry fish and beans group and fats oil sweets/drinks.

2. Evaluation of food groups: The diet chart was evaluated for the presence or absence of selected food groups in the diet of the differently abled children categorised as category 1- vegetable / fruit group and bread cereal group, category 2 - vegetable / fruit group, bread cereal group milk – cheese group, category 3 - vegetable / fruit group , bread cereal group milk – cheese group meat poultry fish and beans group category 4 - vegetable / fruit group , bread cereal group milk – cheese group meat poultry fish and beans group fat s oil sweets / drinks

Statistical analyses: Data was expressed as mean \pm standard deviation (SD). All the tests of significance were carried out at 5% level of significance. Means were compared between two groups using Student t test (normal distribution) or Mann Whitney U test (when distribution was not normal). Comparison of means between more than two groups was done using ANOVA (normal distribution). Proportion of malnutrition between two or more groups was compared using chi-square test Kruskal Wallis test. Differences were considered as significant whenever $p < 0.05$. All statistical analyses were carried out using Windows/SPSS ver. 14.

Results: The conditions prevailing in these children were mental retardation (55.81%) autism (12.40%) cerebral palsy (9.30 %) and Down syndrome (9.30), speech and hearing disability (7.75), hearing impaired (5.43)

TABLE 1: Classification of the data with respect to age, gender and condition

Variables		Frequency	Percent
Age group	0 to 13 years	60	46.51
	14 to 21 years	46	35.66
	21 o 35 years	15	11.63
	> 35 years	8	6.20
	Total	129	100.00
Gender	Female	68	52.71
	Male	61	47.29
	Total	129	100.00
Condition	Autism	16	12.40
	Cerebral Palsy	12	9.30
	Down Syndrome	12	9.30
	Speech and Hearing disability	10	7.75
	mental retardation	72	55.81
	Hearing Impaired	7	5.43
	Total	129	100.00

Descriptive Statistics of the variables (Table 1)

Differently abled children in the age group of 0-13 years were more followed by 14-21 years and only with 8 above 35 years.

Female to male ratio of differently abled children was more in females 52.71 % followed by male 47.29%

BMI inference(Table 2) .The differently abled children (129) assessed from the 3 centers was shown to be normal in 47.29% of them , followed by obese in 27.13%,overweight in 17.05% and underweight 8.53%

MUAC inference (Table 2) was shown that 82.17% were normal, 14.73 were undernutrition and 4% were severely acute malnutrition.

BODY FAT GROUP inference was shown that 63.57% were healthy, 22.48% were under fat and 13.95% over fat

The diet practices followed were majority consumed (44.19%) belonged to category 3 (vegetable / fruit group, bread cereal group milk – cheese group meat poultry fish and beans group) and 42 participants (32.56%) belonged to category 4 (vegetable / fruit group, bread cereal group milk – cheese group meat poultry fish and beans group fat s oil sweets / drinks)

Table 2: Assessment of nutritional status with anthropometric measurements

Variables		Frequency	Percent
BMI group	Under weight	11	8.53
	Normal	61	47.29
	Over weight	22	17.05
	Obese	35	27.13
	Total	129	100.00
MUAC	Normal	106	82.17
	Under Nutrition	19	14.73
	SAM	4	3.10
	Total	129	100.00
Body Fat group	Under fat	29	22.48
	Healthy	82	63.57
	Over fat	18	13.95
	Total	129	100.00
Diet practice	Category -1	4	3.10
	Category - 2	26	20.16
	Category - 3	57	44.19
	Category - 4	42	32.56
	Total	129	100.00

Discussion: Nutrition disorders and compromised nutritional status are common among children with special health care needs main concerns are altered nutritional needs, behavioural issues and physical problems.¹² As many as 40% of infants and children with special health care needs are at nutritional risk Differently abled children suffer the same ill-effects of under nutrition as those without: poorer health outcomes; missing or delayed developmental milestones; avoidable secondary impairments; and, in extreme circumstances, premature death. In some cases, under nutrition is a direct consequence of specific physical anomalies or medical problems.¹³

The effects of poor nutrition on children with pre-existing disabilities in the context of poverty and malnutrition; individuals often assume that these children do not grow and thrive because of their disability. However, in some cases, what is assumed to be disability-associated ill-health and wasting might in fact be connected with feeding problems or the withholding of adequate nutrition, particularly in households and alternative care settings with scarce resources when it is believed a child with a disability will not live to adulthood.

The Child Health and Disability Prevention (CHDP) Program Health Assessment Guidelines.¹⁴ (guideline #4) recommend anthropometric measurements in all children and adolescents at each preventive visit

to ensure adequate growth patterns and to assess the risk of obesity. However, according to the CHDP guidelines, steady change of the growth curve on serial measurements is a reliable indicator of an abnormal growth pattern and warrants further workup. For infants and toddlers less than two years of age, weight, length, and head circumference are indicated anthropometric measurements at each well-visit. For children greater than two years of age, indicated measurements include weight and length. Body Mass Index (BMI) measurement is recommended for all children two years and older to determine adequate nutritional status and risk of obesity. Mid upper arm circumference (MUAC) is a useful tool for a fast assessment of the nutritional status. It is an easy and inexpensive way to detect nutritional status for rapid and extensive nutrition surveillance and screening programs the use of skin fold thickness in the assessment of nutritional status is based on the accumulation of subcutaneous fat. Triceps, biceps, suprailiac and sub scapular skin folds are generally measured for nutritional assessment of children.¹⁵

Skin fold thickness measurements are widely used to assess body fat because the measurements are non-invasive, simple, and less expensive than laboratory-based techniques.¹⁶ It is an important and valid anthropometric indicator of the amount of subcutaneous fat tissue and regional fatness.¹⁷ Even nutrition plays a pivotal role in assessment of health status.

Nutrition is important at every age of growing special child, proper nutrients promotes to grow up healthy and strong. Development.¹⁸ In the present survey differently abled children were up to 46.51 percent in the age group of 0-13 year and after 35 year it has reduced drastically to 6.2 %. This would be suggesting the poor survival rate. A survey in India on physical disabilities born into the families without education and resource has reported increased risk of abutment. Survival rate in children with disabilities is based on underlying cause only; it was found that developmental disabilities were the fifth leading cause of non traumatic death for children between 1 and 14 years of age and the third leading cause of non-traumatic death for children between 15 and 19 years. When a multiple cause approach was used to define developmental disability-related deaths (i.e. when contributing as well as underlying cause was considered), the number of such deaths nearly doubled. The female to male ratio of disability was found to be slightly more in female from the present survey. The most common prevailing condition observed were cerebral palsy, autism, Down syndrome, and hearing and speech disability with increased percentage for mental retardation was more

Studies document various associated health risks for children with developmental disabilities states that Using the 2006-2010 National Health Interview Surveys, prevalence of numerous medical conditions differently abled classified groups: autism (N = 375), intellectual disability autism (N = 238); attention-deficit/hyperactivity disorder (N = 2901); and learning disability or other developmental delay without ADHD, autism, or ID (N = 1955); were compared to children Prevalence estimates for most medical conditions examined were moderately to markedly higher for children in all four groups.¹⁹

The World Report on Disability which was published in year 2011 by the World Bank and WHO reports that there are more than one billion people globally living with disabilities. This includes approximately 93 million children aged 0–14 years living with “moderate or severe disability” (5.1%) of whom 13 million (0.7%) experience severe difficulties which is the major concern. – UNICEF estimating that there were 150 million children with disabilities globally in 2005 which is gradually increasing till date so nutrition always has a pivotal role in growth and development in these children for healthy lifestyle.²⁰

Each food group has different nutrients which your child’s body needs to grow and work properly. That’s why we need to eat a range of foods from across all five food groups. Fruit and veggies give your child energy, vitamins, anti-oxidants, fibre and water. Bread cereal food group give children the energy they need to grow, develop and learn, milk and cheese food group are good sources of protein and calcium. Meat poultry fish and beans food group are Protein-rich foods are important for child’s growth and muscle development... Iron and omega-3 fatty acids from red meat and oily fish are particularly important for your child’s brain development and learning

Three day recall diet history was taken to assess the diet practices and food group they consumed by differently abled children from three centre studied in this survey

in the present study majority of them consumed major food groups necessary in daily practice that co related with the findings with BMI, MUAC and SKIN FOLD THICKNESS Body fat group that has shown up to 47.29 % having normal BMI and 82.17 normal MUAC ad the 63.5 health body fat . This suggesting that these children had appropriate food group and nutrients. However some percentage of undernourished obese and children with over fat was also observed in criteria.

In differently abled children undernutrition can reflect into major impact on their growth and development along with the consequence effect on existing condition.

Severe acute malnourished individuals 3.1 % that would be of serious concern.

In view of the strong links between nutrition, disability, poverty and human rights, awareness of and stronger links between nutrition and disability issue was urgently needed at all levels. A so-called twin track approach

was needed whereby nutrition services include (mainstream) disability and also provide disability specific services, while disability program ensure that specific nutrition-focused support is provided when needed.⁵⁵ Most nutrition and feeding problems of children with special health care needs can be improved or controlled, but often are not totally resolved. These children will require ongoing and periodic nutrition assessment and intervention thus it is especially important for children with developmental disabilities to see a health care provider regularly.²⁰

Conclusion

1. Among all the differently abled children attending the Special schools in Coorg district the gender distribution was more in Females.
2. The most prevalent medical condition were mental retardation seen Cerebral palsy, Down syndrome children, speech and hearing, autism and Hearing impairment.
3. The major percentage was observed in age group 0-13 years (46.51)
4. From the 3 day diet assessment obtained, it was observed that children from all the three centers were predominantly on vegetable / fruit Group, bread cereal group milk – cheese group and meat/poultry/fish And beans group
5. 47.29 % children with disability were having normal BMI. 82.17 % Were having normal MUAC and 63.57% children were having healthy Body fat percentage .About 32.5 % had a balanced diet practice
6. 4% children were severely acute malnourished (SAM), 19 % were having under nutrition and 35% children were found to be obese.

Acknowledgement: we gratefully acknowledge the assistance of Mrs Aarti somaiah, Mrs Geeta chengappa and Mrs Gita, presidents of Cheshire homes, swastha school and kodagu vidyalaya for giving permissions, we thank our Dieticians Prabhavati, Akshata and veena for constant support and guidance.

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