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Assessment of the Nutritional Status among the School-going Children aged 6-8 Years from Port Blair, South Andaman, India: A Cross-sectional Study

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KEYWORDS

School-going children, Stunting, Wasting, Underweight, Thinness, Andaman and Nicobar Islands

ABSTRACT

Regular nutritional monitoring is imperative specifically among the children for formulating more effective nutritional policies at the national level. Keeping this view, the present cross-sectional study was undertaken to determine the nutritional status by using four commonly used anthropometric indicators: stunting (low height for age), wasting (low weight for height), underweight (low weight for age), and thinness (using body mass index-BMI) among 200 children between 6-8 years of age from Port Blair, South Andaman district of Andaman and Nicobar Islands. In conclusion, it can be said that the overall health condition of these children was better in comparison to other studies from India in recent years. Though the sample size is small but similar kinds of studies from other islands with more sample sizes are required for better understanding, evaluation, and implementation of more effective nutritional programs.

Introduction

The first five years of a child's life is very important to look after; as an estimated 5.2 million children in this age group died worldwide in 2019 according to the recent statement of the World Health Organization (WHO 2020). Unfortunately, in most cases, it can be preventable and curable with basic lifesaving interventions like skilled delivery at birth, timely vaccinations, child feeding practices, access to safe drinking water, quality food, and most importantly adequate nutrition (WHO 2020). Malnourished children are more suspectable to infectious diseases and causing 45% deaths in children under-5 years of age; and in India, the condition is alarming as our country ranked 2nd position after Nigeria with an estimated 8,24,000 number of deaths in 2019 (WHO 2020).

For decades, researchers from different disciplines have been searching for the mechanisms to combat the burden of malnutrition but unfortunately, the results are not satisfactory. Researchers from all over the globe, commonly used four anthropometric indicators to access the nutritional status of the children: stunting (low height for age), wasting (low weight for height), underweight (low weight for age) following WHO criteria (below -2 standard deviation) (WHO 1995) and thinness (age and sex-specific BMI) (Cole et al. 2007). Global Nutrition Report (2020) pointed out that the prevalence of stunting (34.7%) and wasting (17.3%) of children under-5 years in India is higher than the average for the Asian region (stunting- 21.8%, wasting- 9.1%). The recent National Family Health Survey 2015-16 (NFHS-4) reported the prevalence of stunting, wasting, and underweight for children under-5 years in India is 38.4%, 21%, and 35.7% respectively. On the other hand, a considerable number of deaths (estimated 5,00,000) of old age children (5-9 years) was reported by WHO in 2019 which equally claim

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attention for doing research in this group of children (WHO 2020). But data on older school-going children of 6-8 years was scanty, even National Family Health Survey did not include the children and adolescents of 6 to 14 years in their periodical surveys. In recent years, regional studies in India have been reported about the health conditions of the school-going children (Ruchika et al. 2008; Deb et al. 2010; Fazili et al. 2012; Srivastava et al. 2012; Das et al. 2013; Pandey et al. 2018) but studies from islands specifically in the context of Andaman and Nicobar Islands (ANI) were very limited (Sahani et al. 2014; Chander et al. 2018).

The ANI is a group of more than 500 islands located in the Bay of Bengal of which only a few are inhabited. ANI is unique in many respects not only for India but in the world context as it is the only homeland for the world's indigenous ethnic communities like the Jarwas, Onges, Sentinelese, Great Andamanese, and Shompen (Goyal 2014). Historically, ANI was popular as a penal settlement formed by the British during the 1850s to keep prisoners, and after independence, these areas were majorly populated by immigrant settlers from different corners of India as well as from few neighbouring countries (Kailash 2000; Pandya 2002; Goyal 2014). From 2008, National Rural Health Mission (NRHM) started to operate in ANI under which basic health facilities are provided to the commoners through public health-centers, sub-centers, district hospitals, AYUSH, Unani, homeopathic hospitals, and medical dispensaries in remote areas (Goyal 2014). NFHS-4 data revealed the frequency of stunting (32.5%) and underweight (33.5%) in ANI was lower than the national level but significantly higher for wasting (31.7%) among children under 5 years. Few sporadical studies have been reported from ANI in recent years where Chander et al. (2018) reported prevalence of undernutrition (24.3%) among Onges of 5-19 years; on the other hand, Sahani et al. (2014) studied nutritional conditions of Car Nicobarese and Moplah children of 6-10 years.

Therefore, keeping the view of the above situation, it was imperative to evaluate the health conditions of the school-going children, and the present study was formulated to assess the nutritional status of school-going children aged 6-8 years from Port Blair, South Andaman district of Andaman and Nicobar Islands.

Material and Methods

The present cross-sectional study was conducted among 200 school-going children of 6-8 years from one Private School (PS) and one Government School (GS) at Port Blair, South Andaman district of Andaman and Nicobar Islands. The sample size was constituted of 200 students from each school including 50 boys and 50 girls from the class of I-III. The multistage random sampling method was used for data collection. Necessary permission was obtained from the school authority before data collection. The information regarding age was collected from school records. The details of the participants were stated below:

Table 1: Details of the studied participants

Age (years)	Private School		Government School		Total
	Boys	Girls	Boys	Girls	
6	18	15	17	15	65
7	16	15	16	16	63
8	16	20	17	19	72
Total	50	50	50	50	200

Height (cm) and weight (kg) were measured by following the standards anthropometric techniques (Lohman et al. 1988). Body Mass Index (BMI) was calculated by using internationally accepted formula: BMI = weight (kg) / height (m2). Both boys and girls were classified using the categories of height for age (stunted), weight for height (wasted), and weight for age (underweight) by using international reference values (WHO 1995). For determining thinness, age, and sex-specific BMI cut-off points were used by following the classification proposed by Cole et al. 2007. Technical error of measurements was found within the reference values (Ulijaszek and Kerr 1999).

All the statistical analyses were undertaken by using the Statistical Package for Social Science (IBM SPSS statistics 26). Mean and standard deviation (SD) were calculated for age, height, weight, and BMI, and independent *t*-Test were performed to find out significant differences among mean height, weight, and BMI across the ages and schools. Statistical significance was set at $p < .05$.

Results

Table 2: Variation of anthropometric variables among 6-8 years boys and girls of Private and Government school, Port Blair, Andaman

Variables	Type of School	Boys (n=100)				Girls (n=100)			
		6 yrs	7 yrs	8 yrs	Pooled	6 yrs	7 yrs	8 yrs	Pooled
Height (cm)	PS	119.61 (8.96)	122.97 (3.44)	125.65 (13.76)	122.62 (9.78)	118.13 (3.88)	122.99 (5.53)	126.78 (8.03)	123.05 (7.15)
	GS	118.41 (9.14)	121.29 (9.10)	122.82 (13.22)	120.83 (10.64)	112.91 (5.93)	119.39 (8.92)	122.07 (8.56)	118.47 (8.72)
	t	0.391	0.688	0.602	0.872	2.851	1.337	1.913	2.871
	p	.348	.248	.275	.192	.004	.095	.031	.002
Wight (kg)	PS	21.11 (4.50)	23.93 (5.53)	25.81 (6.38)	23.52 (5.72)	18.93 (3.55)	23.33 (4.90)	26.2 (6.04)	23.16 (5.82)
	GS	21.52 (4.66)	23.75 (6.06)	25.88 (8.54)	23.72 (6.74)	18.4 (4.86)	21.46 (3.88)	22.52 (4.08)	20.95 (4.53)
	t	-0.269	0.091	-0.132	-0.159	0.342	1.176	2.212	2.117
	p	.394	.463	.447	.436	.367	.124	.016	.018
BMI (kg/m^2)	PS	14.78 (2.88)	15.75 (3.23)	16.48 (3.73)	15.63 (3.29)	13.61 (2.73)	15.44 (3.10)	16.24 (3.23)	15.21 (3.18)
	GS	15.30 (2.61)	15.89 (2.40)	17.33 (5.32)	16.18 (3.74)	14.31 (2.82)	15.07 (2.41)	15.12 (2.21)	14.86 (2.44)
	t	-0.565	-0.142	-0.525	-0.775	-0.695	0.380	1.254	0.616
	p	.287	.443	.301	.220	.246	.353	.108	.269

Standard deviations (SD) are presented in the parenthesis, PS= Private School, GS= Government School

Table 2 showed the variation in the mean (SD) of anthropometric variables among 6-8 years boy and girl students from PS and GS of Port Blair. As to height, it has been observed that both boys (122.62±9.78) and girls (123.05±7.15) from PS are taller compared to GS boys (120.83±10.64) and girls (118.47±8.72). As to weight, no such mean differences were found between boys of both schools but girls from PS (23.16±5.82) were a little heavier than the girls of GS (20.95±4.53). No mean differences

were seen between PS boys (15.63±3.29) and girls (15.21±3.18) regarding BMI but boys (16.18±3.74) of GS have greater BMI than girls of GS (14.86±2.44). No statistically significant differences between boys from PS and GS across ages in height, weight, and BMI were noticed. In case of mean height of girls of 6 years and 8 years, the difference between PS and GS was statistically significant ($t = 2.851$, $p = 0.004$ and $t = 1.913$, $p = 0.031$) with overall significant differences across ages ($t = 2.871$, $p = 0.002$). In case of 8 years girls mean weight has shown statistically significant difference between PS and GS ($t = 2.212$, $p = 0.016$) with overall differences across ages ($t = 2.117$, $p = 0.018$).

Table 3: Prevalence of stunting, wasting, underweight and thinness among the studied boys and girls of Private and Government school, Port Blair, Andaman

Nutritional Indicators	Type of School	Age Groups (years)					
		6		7		8	
		Boys (n= 35)	Girls (n= 30)	Boys (n= 32)	Girls (n= 31)	Boys (n= 33)	Girls (n= 39)
Stunting	PS	1 (2.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	GS	1 (2.8)	3 (10.0)	4 (12.5)	3 (9.7)	4 (12.1)	3 (7.7)
	Total	2 (5.7)	3 (10.0)	4 (12.5)	3 (9.7)	4 (12.1)	3 (7.7)
Wasting	PS	1 (2.8)	0 (0.0)	1 (3.1)	1 (3.2)	0 (0.0)	0 (0.0)
	GS	0 (0.0)	2 (6.6)	0 (0.0)	0 (0.0)	1 (3.0)	0 (0.0)
	Total	1 (2.8)	2 (6.6)	1 (3.1)	1 (3.2)	1 (3.0)	0 (0.0)
Underweight	PS	3 (8.6)	1 (3.3)	1 (3.1)	0 (0.0)	2 (6.1)	1 (2.6)
	GS	3 (8.6)	3 (10.0)	2 (6.2)	1 (3.2)	3 (9.1)	0 (0.0)
	Total	6 (17.1)	4 (13.3)	3 (9.4)	1 (3.2)	5 (15.1)	1 (2.6)
Thinness	PS	8 (22.8)	11 (36.6)	4 (12.5)	5 (16.1)	6 (18.1)	3 (7.6)
	GS	7 (20.0)	9 (30.0)	3 (9.3)	6 (19.3)	7 (21.2)	7 (17.9)
	Total	15 (42.8)	20 (66.6)	7 (21.8)	11 (35.4)	13 (39.3)	10 (25.6)

Percentages are presented in the parentheses, PS= Private School, GS= Government School

Table 3 revealed the prevalence of stunting, wasting, underweight, and thinness among the boy and girl students of PS and GS of Port Blair, Andaman. In case of stunting, irrespective of age and sex, all cases were reported from GS except 1 boy of 6 years (2.8%) from PS. On the other hand, all boys across the ages showed an equal frequency of wasting but for girls, 2 from 6 years (6.6%) and 1 from 7 years (3.2%) were reported. In contrast to the stunting, the cases of wasting were equal for both the PS and GS though the overall frequency was nominal (3%). Furthermore, the total number of underweight cases was higher among boys (14) compared to girls (6) across ages. Like wasting, the same trend was observed for underweight in PS and GS. In comparison to the other three nutritional indicators, thinness was found in higher frequencies in both boys (35%) and girls (41%). A trend has been observed for girls where with increasing age (6 to 8 years) frequency of thinness was decreasing (66.6%, 35.4%, and 25.6%) but for boys, slightly decrease from 6 to 7 years (42.8% - 21.8%) and then increasing (8 years: 39.3%) with an overall prevalence of 38% thinness.

Discussion

The present study attempted to determine the nutritional status of 200 school-going children aged 6-8 years from one government and one private school, Port Blair, Andaman. Results revealed the prevalence of stunting, wasting, underweight, and thinness were 9.5%, 3%, 10%, and 38% respectively.

The findings of the present study showed a much lower prevalence of stunting, wasting, and underweight than the recent study by India State-Level Disease Burden Initiative Child Growth Failure (CGF) Collaborators (2020) where the comparatively higher prevalence of stunting (39.3%), wasting (15.7%), and underweight (32.7%) was reported at the national level. Similarly, the same trend was found among the other research works conducted across the India (Medhi *et al*. 2006, Ruchika *et al*. 2008; Srivastava *et al*. 2012; Pandey *et al*. 2018). This can be explained by the influence of positive socio-economic status over time in Port Blair, Andaman. Strikingly, this study also exhibited a moderately high prevalence of thinness ranged from 21.8%-42.8% among boys and 25.6%- 66.6% among girls which has corroborated with other contemporary studies in different parts of India (Chakraborty and Bose 2009; Mondal and Sen 2010; Debnath *et al*. 2018).

Though the present study has revealed comparatively better nutritional status in terms of stunting, wasting, and underweight but thinness has shown quite high prevalence which was a matter of concern. Thinness, a marker of malnutrition introduced by Cole et al. 2007 as the low BMI for age does not necessarily depict the undernourishment among children. But thinness considerably affects the health, physical and intellectual development, the wellbeing of children, and flourishing of adolescents which can extend into adulthood (Tambalis et al. 2019; Suder et al. 2020). On the other hand, the present study manifested a comparatively higher frequency of thinness among girls than boys which may result in stunting at a later age in combination with menstrual irregularities (Dars et al. 2014), delayed maturation (Karlberg and He 2001) and many more. The probable explanation behind this phenomenon may be socio-economic and cultural attributes, dietary habits, and care practices. Additionally, girls also revealed a higher prevalence of thinness at the age of 6 yrs (66.6%) followed by 7 yrs (35.4%) and 8 yrs (25.6%) which signified reduced appetite followed by poor eating habits including an improper diet deficient in elements necessary for development.

Type of school also demonstrated variations in thinness (GS = 51.31%, PS=48.65%), and stunting (GS = 94.73%, PS=5.26%) among studied group from PS and GS in present study. This finding was substantiated with other research works from different parts of the globe (Gebregyorgis et al. 2016; Sharma et al. 2019). This may be expected due to varying school environment as government schools were mostly less hygienic than the private schools which may expose students to a wide variety of infectious diseases that prompts poor nutritional status (Gouda et al. 2013; Saha 2019). Nevertheless, the mid-day meal provided by government schools has to be supplemented by diet at home which may not feasible in the lower socio-economic strata. Other reasons could be the students of government schools majorly came from lower socio-economic strata who were involved in higher energy expenditure activities other than their academic activities. Similarly, less thinness from Private school reflected the overindulgence in food habits and relatively sedentary life in the upper socio-economic class. Despite having some limitations such as low sample size that influenced the reliability of the findings as well as interpretation of results and inability to settle any conclusive remarks based on generalizability and establishment of internal and external validity, the results of the present study indicated better nutritional situation of these children.

Subsequently, keeping the view of the findings of the present study, the authors proposed more exploratory research on the screening of malnutrition among school-going children of ANI where potential confounding factors influencing growth and development could be evaluated with special accentuation to the information on morbidity, dietary habits, and physical activities of the children. Nevertheless, the present study also recommended the inception of nutritional programs and regular nutritional assessment and evaluation of the health conditions among the children in schools by skilled anthropometricians. Apart from that, periodical nutritional supplements rich in micronutrients in addition to the ongoing mid-day meal scheme may be introduced in both government and private schools along with sensitization programs for disseminating the knowledge related to nutritional prerequisite during childhood and pre-adolescent stage among parents.

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