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Assessment of the nutritional status of malnourished school-age Egyptian children

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Abstract

Background

The nutritional status of school-age children is a primary determinant of children's health, as it influences their physical and mental development. The aim of this study was to assess the nutritional status and dietary intake of macronutrients and micronutrients in a sample of malnourished school-age children (5–12 years) in Egypt.

Patients and methods

This was a cross-sectional study that included school-age children (5–12 years) recruited from the outpatient clinic of the National Nutrition Institute, Cairo, Egypt. Participants sampling was performed during the period from June to August 2019. In this study, 85 children of both sexes were enrolled.

Results

The studied group constituted 52 boys and 33 girls. There was no statistical difference between them regarding age or sex distribution, and also, the anthropometric measures showed that there were highly significant differences in the weight and BMI between the different groups, but with no difference in the height. More than 50% of the undernourished children were taking unsafe levels of carbohydrates (55.3%) and calories (52.6%), and ~ 40% were taking an unsafe level of fat. Only 2.6% had an unsafe level of consumption of proteins. There was a significant difference in the distribution of % recommended dietary allowances of macrominerals in undernourished and overnourished children compared with that of the normal group. Regarding vitamin intake, the authors found that most undernourished children were consuming unsafe levels of vitamins.

Conclusion

These findings highlight the need for dietary intervention measures in school-aged children.

Keywords: Malnutrition, micronutrients, nutritional status, schoolchildren

Introduction

Malnutrition among children is a major public health concern, affecting all aspects of children's lives [1]. The WHO defines malnutrition as 'Deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients.' [2].

Childhood overweight and obesity have been considered by the WHO as a serious public health challenge, especially in low-income and middle-income countries [3]. According to the International Obesity Task Force, at least 155 million of the world's children aged 5–17 are overweight, including 35–40 million obese [4]. Egypt is one of the low-middle-income countries, with growing concerns about overweight and obesity among schoolchildren and a marked increase in prevalence from 6 to 15%, between 1990 and 2010 [5].

Overweight and obesity in school-age children could be linked to various causes, such as modern lifestyles characterized

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by lack of activity and passive overeating [6]. Junk food is a major cause of obesity; excess fat, carbohydrates, and processed sugar found in junk food contribute to increased risk of cardiovascular disease, diabetes, and other chronic health conditions. Children eating more junk food are more liable to have lower intakes of minerals, vitamins, and essential fatty acids.

The aim of this study is to assess the nutritional status and dietary intake of macronutrients and micronutrients of a sample of malnourished school-age children (5–12 years) in Egypt.

Patients and methods

This was a cross-sectional, case–control study that included school-age children (5–12 years) recruited from the outpatients' clinic of the National Nutrition Institute (NNI), Cairo, Egypt. Malnourished children were selected from those visiting the NNI for the first time, and the control children were selected from their healthy relatives or from children who were under follow-up. This study was approved by the Medical Research Ethics Committee of the National Research Centre, Giza, Egypt. Participants sampling was performed during the period from June to August 2019.

In this study, 85 children of both sexes (61.2% boys and 38.8% girls) were enrolled. All children were subjected to general physical and clinical examinations. Anthropometric measurements were done to define the nutritional status of each child. Dietary analysis was done to characterize the nutritional habit and nutrients deficiency of each child. In the National Research Centre, laboratory investigations were conducted to measure the micronutrient levels in plasma.

Clinical examination included the assessment of the child's general condition, such as appearance, skin color, general weakness, and concentration ability. Children with organic and genetic disorders that might interfere with normal growth and also those with alimentary canal disorders that may cause secondary malnutrition were excluded from the study.

Anthropometric measurements

In our study, the height, weight, and BMI measurements were done according to WHO, 2007. Height was measured using the Raven Minimeter. Weight was recorded using a standardized platform scale. Assessment of weight and height status was as follows: wasting: less than or equal to 2SD, normal: −2 to +2SD, and overweight: more than +2SD.

Height status was assessed using height for age *Z*-scores. The following categories of height status were determined: stunting: less than −2SD, normal: −2 to +2SD, and tall: more than +2SD.

BMI *Z*-score growth chart was used as a reference for school-age children (5–12 years) released by the WHO (2007); children less than − 2SD were described as underweight, children between − 2SD: +2SD were described as normal, that greater than + 2SD was described as overweight, and more than + 3SD were described as obese [7].

Quantitative daily consumption

The mean daily intake of nutrients was determined using the 24-h recall method. This is a quantitative daily consumption recall method designed to measure the quantity of foods consumed over one-day period. Interviews and questionnaires were adapted for the collection of data; each child's mother met a specialized dietitian in the NNI to undergo dietary analysis. Consumed foods were quantified using household measures (such as measuring spoons and cups) and converted to grams. The food composition tables of NNI were used to calculate the amount of nutrients consumed in international units [8].

Dietary adequacy

According to FAO/WHO/UNU (2004) [9], we had four levels of consumption [(recommended dietary allowances (RDA)]:

(1) Unsafe level of consumption: in which the child takes less than 50% of recommended intake.
(2) Unacceptable level: in which the child takes greater than or equal to 50–75% of recommended intake.
(3) Acceptable level: in which the child takes greater than or equal to 75–120% of recommended intake.
(4) Overconsumption: in which the child takes greater than or equal to 120 of recommended intake.

Micronutrients assessment

Plasma levels of vitamins A, C, B12, and D as well as Fe, Zn, Ca, P, Mg, and Cu were measured and compared with the international reference ranges to determine their deficiency or sufficiency in each child.

Sample collection and preparation

A sample of venous blood collected from each child in EDTA-containing vacutainer tube was separated by centrifugation at 3000 rpm for 10 min at 4°C; aliquots of 100 μl plasma were prepared and stored at −20°C for biochemical investigation of the selected micronutrients.

Statistical analysis

Nutrient intake was calculated using the Computer-Aided Nutritional Analysis Program, the food composition Table 2006, NNI, Cairo, Egypt. Data were analyzed using SPSS for windows 23 (SPSS Inc., Chicago, Illinois, USA) computer program. The independent *t*-test was used for two groups' comparisons. One-way analysis of variance test with post-hoc Tukey's honest significant difference was used for comparisons between the underweight, normal, and overweight groups. χ^2 with a post-hoc Bonferroni test was used for comparisons of proportions. Person's correlation was used to estimate the linear correlation between variables. Data were expressed as the mean ± SD, and statistical significance was set at *P* less than 0.05.

Results

Demographic characteristics and anthropometric measures are shown in Table 1. The studied group constituted of 52 (61.2%) boys and 33 (38.8%) girls. Their mean age was 8.4 ± 2.1, weight was 31.3 ± 16.4 kg, height was 125.4 ± 12.2 cm, and BMI was 9.1 ± 7.2 kg/m^2 (Table 1).

Table 2 shows the demographic characteristics and anthropometric measures of the different groups. The children in the different groups were of matched ages. The average ages of the underweight, normal and overweight groups were 8.60 ± 1.8, 8.0 ± 2.0, and 8.7 ± 2.3, respectively, with no statistical difference between them. Sex distribution also showed no statistical difference. The anthropometric measures showed that there was a highly significant difference in the weight and BMI between the different groups, with no statistical difference in the height.

Table 3 presents the distribution of macronutrients in undernourished and overnourished children compared with that of the normal group. Dietary adequacy was assessed by comparing the energy and nutrient intake of each child with his RDA. More than 50% of the undernourished children were taking unsafe levels of carbohydrates (55.3%) and calories (52.6%), and ~ 40% were taking an unsafe level of fat. Only 2.6% had an unsafe level of consumption of proteins. There was a significant difference in calories and fat intake of undernourished children and normal groups. On the contrary, the majority of the overnourished children recorded overconsumption levels of macronutrients; proteins, fat, and carbohydrates (94.1, 64.7, and 52.1%, respectively).

The majority of undernourished children were taking unsafe levels of consumption of calcium (Table 4). Overconsumption of microminerals was obvious in overnourished children, such as iron, zinc, and copper, as shown in Table 4. There was a significant difference in %RDA distribution between overnourished and normal children in zinc and copper (P<0.05).

Regarding vitamin intake, we found that that most undernourished children were consuming unsafe levels of vitamin A (84.2%) and vitamin D (76.3%). Overall, 57.9% were consuming unsafe levels of vitamin C. There was no significant difference in %RDA distribution between undernourished and normal children concerning vitamin consumption. As shown in Table 4, most overnourished children were consuming unsafe levels of vitamins A, C, and D. The significant difference in %RDA distribution between overnourished and normal children was in the consumption of vitamins A (P<0.05).

Table 5 shows that the mean intakes of vitamin A by the underweight, lean, and overweight children showed no statistical difference (P=0.767). Moreover, there were no statistical differences (P=0.419) between them regarding the circulating plasma levels. Plasma levels of vitamin B12 in the three groups showed no statistical difference (P=0.631). Vitamin D intake by the three groups showed no statistical difference (P=0.144). However, its mean level in the overweight group was highly significantly lower than those of the underweight and lean groups (P<0.007). The average Fe intake by the overweight children was highly significantly higher than Fe intake by the other two groups (P<0.001). The overweight children showed a highly significant higher circulating level compared with the other groups (P<0.003). There was no significant difference between Zn intake between the three groups (P=0.137). However, Zn average plasma level in overweight children was highly significantly higher than that of underweight and lean children (P<0.001). The mean Cu intake by the overweight children was highly significantly higher than that of the other groups (P<0.001). The average circulating levels of Cu showed a highly significant difference in the three groups (P<0.001).

The percentages of micronutrient deficiencies in the different groups are shown in Fig. 1. Vitamin A deficiency showed similar prevalence between the different groups, where it accounted for 40.9, 32.5, and 44.0% in the underweight, lean, and overweight groups, respectively (P = 0.614). Vitamin B12 deficiency accounted for 100% of the three groups. There

Table 1: Demographic characteristics and anthropometric measures of the studied groups

Variables	*n* (%)
Sex	
Male	52 (61.2)
Female	33 (38.8)
Weight status	
Underweight	38 (44.7)
Normal	30 (35.3)
Overweight	17 (20)
Age (years) [mean±SD (range)]	8.4±2.1 (5.0-12.0)
Weight (kg) [mean±SD (range)]	31.3±16.4 (11.5-78.0)
Height (cm) [mean±SD (range)]	125.4±12.2 (96.0-152.0)
BMI (kg/m^2) [mean±SD (range)]	19.1±7.2 (10.2-36.1)

Table 2: Demographic characteristics and anthropometric measures of the different groups

Variables	Underweight (*n*=38) [*n* (%)]	Normal (*n*=30) [*n* (%)]	Overweight (*n*=17) [*n* (%)]	*P*
Sex				
Male	22 (57.9)	19 (63.3)	11 (64.7)	0.872#
Female	16 (42.1)	11 (36.7)	6 (35.3)	
Age (years)	8.6±1.8	8.0±2.0	8.7±2.3	0.389^
Weight (kg)	18.7±3.0	25.6±5.9	51.4±16.6	<0.001*,^
Height (cm)	123.5±9.1	124.0±11.2	129.5±15.4	0.149^
BMI (kg/m^2)	12.2±1.0	16.7±1.8	29.2±4.3	<0.001*,^

Table 3: Percentage of RDA distribution of calories, protein, carbohydrates, and fat of undernourished and overnourished compared with that of the normal group

	Undernourished [*n* (%)]	Normal [*n* (%)]	P_1	Overnourished [*n* (%)]	P^2
Calories					
Unsafe	20 (52.6)	6 (20.0)		1 (5.9)	
Unacceptable	13 (34.2)	10 (33.3)	0.009	0	0.004
Acceptable	4 (10.5)	10 (33.3)		7 (41.2)	
Overconsumption	1 (2.7)	4 (13.4)		9 (52.1)	
Protein					
Unsafe	1 (2.6)	1 (3.3)	NS	0	
Unacceptable	4 (10.5)	2 (6.7)	0.158	0	0.352
Acceptable	15 (39.5)	5 (16.7)		1 (5.9)	
Overconsumption	18 (47.4)	22 (73.3)		16 (94.1)	
Carbohydrates					
Unsafe	21 (55.3)	10 (33.3)	NS	1 (5.9	
Unacceptable	11 (28.9)	9 (30.0)	0.078	0	0.002
Acceptable	5 (13.2)	5 (16.7)		7 (41.2)	
Overconsumption	1 (2.6)	6 (20.0)		10 (52.1)	
Fat					
Unsafe	15 (39.5)	6 (20.0)		0	NS
Unacceptable	13 (34.2)	8 (26.7)	0.011	2 (11.8)	0.085
Acceptable	8 (21.1)	5 (16.7)		4 (23.5)	
Overconsumption	2 (5.3)	11 (36.6)		11 (64.7)	

P_1, undernourished vs normal; P_2, overnourished vs normal; RDA, recommended dietary allowance. <50% unsafe level of consumption. ≥50-75% needs improvement. ≥75-120% accepted level of consumption. ≥120% overconsumption.

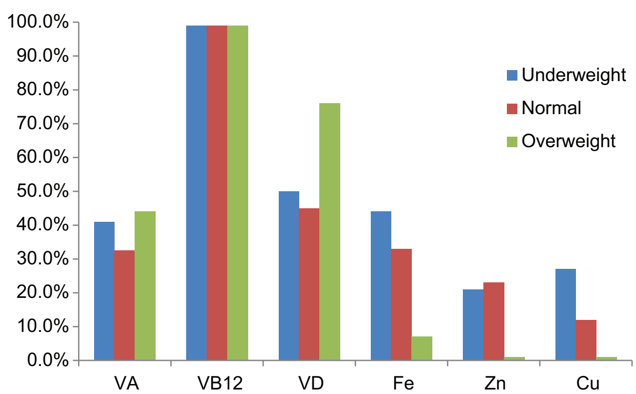

Figure 1: The percentages of micronutrient deficiencies in the different groups.

was a significant difference in the prevalence of vitamin D deficiency among the three groups, which was 50.0, 45.0, and 76.0 in the underweight, lean, and overweight children, respectively ($P<0.05$).

Discussion

It is well documented that undernutrition or overnutrition during childhood can inhibit the physical and mental development of the child [10,11]. The state of being overweight coexists with undernutrition in developing countries [12]. In our study, the overweight group accounted for 20% of the population studied. This prevalence is considerably higher compared with prior studies conducted in various Egyptian cities such as in Cairo (10.3%) [13], Port Said (17.7%) [14], Sharkia (20%) [15], and Sohag (16.5%) [5]. The rate of overweight and obesity in Latin America is significantly higher than in other areas. Most Latin American studies reported prevalence above the median, between 20 and 35% for overweight. In South-East Asia, Africa, the Eastern Mediterranean, and the Western Pacific, the prevalence of overweight and obesity was mostly below the median [16]. In our study, the underweight group accounted for 44.71% of the studied population. In Africa, the Western Pacific Region, and South-East Asia, the prevalence of underweight ranged considerably from below 10% in parts of countries such as Sri Lanka [17], Laos [18], China [19], and South Africa [20], up to 40 or 50%, as reported in a national study from Madagascar [21].

In this study, the average ages of the underweight, normal, and overweight groups were 8.60 ± 1.8, 8.0 ± 2.0, and 8.7 ± 2.3, respectively, with no statistical difference between them. Sex distribution also was the same, with no statically significant differences among the three groups. Our results are consistent with that of Abdelkarim *et al*. [22], who concluded that the distribution of overweight and underweight children was similar in both males and females. Our results were in contrast to that of Abdel Wahed *et al.* [23], who reported that the percentage of underweight in females was significantly higher than in males. This may be explained by the cultural preference of boys over girls in rural areas, which might translate into a better chance of adequate food. Moreover, studies in Bahrain [24], Tunisia [25], Kuwait [26], and Qatar[27] found that the prevalence of overweight among girls

Table 4: Percentage of RDA distribution of micronutrients of undernourished and overnourished compared with that of the normal group

	Undernourished [*n* (%)]	Normal [*n* (%)]	P_1	Overnourished [*n* (%)]	P_2
Phosphorus					
Unsafe	15 (35.5)	7 (23.3)	NS	1 (5.9)	NS
Unacceptable	8 (21.1)	5 (16.7)	0.317	2 (11.7)	0.343
Acceptable	11 (28.9)	11 (36.7)		7 (41.2)	
Overconsumption	4 (10.5)	7 (23.3)		7 (41.2)	
Calcium					
Unsafe	35 (92.1)	23 (76.7)	NS	6 (35.3)	0.006
Unacceptable	3 (7.9)	6 (20.0)	0.166	7 (41.2)	
Acceptable	-	-		4 (23.5)	
Overconsumption	0	1 (3.3)		0	
Magnesium					
Unsafe	12 (31.6)	9 (30)	NS	2 (11.8)	NS
Unacceptable	16 (42.0)	7 (23.3)	0.166	1 (5.9)	0.066
Acceptable	8 (21.1)	8 (26.7)		5 (29.4)	
Overconsumption	2 (5.3)	6 (20.0)		9 (52.9)	
Iron					
Unsafe	11 (28.9)	5 (16.7)	NS	1 (5.9)	NS
Unacceptable	7 (18.4)	5 (16.7)	0.340	1 (5.9)	0.104
Acceptable	14 (36.8)	10 (33.3)		3 (17.6)	
Overconsumption	6 (15.9)	10 (33.3)		12 (70.6)	
Zink					
Unsafe	9 (23.6)	2 (6.7)	NS	0	0.027
Unacceptable	5 (13.2)	7 (23.3)	0.191	1 (5.9)	
Acceptable	12 (31.6)	8 (26.7)		1 (5.9)	
Overconsumption	12 (31.6)	13 (43.3)		15 (88.2)	
Cupper					
Unsafe	5 (13.2)	3 (10.0)	NS	0	0.022
Unacceptable	8 (21.1)	3 (10.0)	0.316	1 (5.9)	
Acceptable	16 (42.0)	11 (36.7)		1 (5.9)	
Overconsumption	9 (23.7)	13 (43.3		15 (88.2	
Vitamin A					
Unsafe	32 (84.2)	28 (93.4)	NS	12 (70.6)	0.014
Unacceptable	2 (5.3)	0	0.501	5 (29.4)	
Acceptable	3 (7.9)	1 (3.3)		0	
Overconsumption	1 (2.6)	1 (2.3)		0	
Vitamin C					
Unsafe	22 (57.9)	20 (66.7)	NS	11 (64.6)	NS
Unacceptable	4 (10.5)	0	0.308	2 (11.8)	0.263
Acceptable	6 (15.8)	6 (20.0)		2 (11.8)	
Overconsumption	6 (15.8)	4 (13.3)		2 (11.8)	
Vitamin D					
Unsafe	29 (76.3)	20 (66.7)	10	10 (58.8)	NS
Unacceptable	1 (2.6)	1 (3.3)	2	2 (11.8)	0.221
Acceptable	3 (7.9)	4 (13.3)	0	0	
Overconsumption	5 (13.2)	5 (16.7)	5	5 (29.4)	

P_1, undernourished vs normal; P_2, overnourished vs normal; RDA, recommended dietary allowance. <50% unsafe level of consumption. ≥50-75% needs improvement. ≥75-120% accepted level of consumption. ≥120% overconsumption.

was higher compared with boys. However, there was a higher prevalence of overweight among boys in countries such as Lebanon[28] and the United Arab Emirates [29]. Divergence between the findings could be explained by differences in genetic, environmental, and sociocultural backgrounds that could probably contribute to the adopted lifestyle.

Regarding the anthropometric measures, this study showed that there were highly significant differences in the weight and BMI between the different groups (underweight, normal, and overweight). Regarding height, there was no statistical difference.

Dietary intake data for children and adolescents are important to guide effective strategies to improve their health and growth.

Table 5: Micronutrients intake and their plasma levels in the different groups

Micronutrient	Underweight (*n*=38)	Normal (*n*=30)	Overweight (*n*=17)	*P*
VA intake (mg/day)	498.6±181.9	530±159.6	533.2±219.8	0.767
VA level (nmol/l)	740.7±235.1	827.2±271	835.2±309.5	0.419
B12 level (pg/ml)	115.8±39.4	124.0±35.4	125.4±38.6	0.631^
VD intake (µg/day)	35.6±16.5	37.9±21.1	46.6±23	0.144
VD level (ng/ml)	28.7±10.7[a]	29.8±11.8[a]	21.4±7.2[b]	0.006
Fe intake (mg/day)	8.3±3.0[a]	9.5±3.6[a]	14.2±4.3[b]	<0.001
Fe level (µg/dl)	54.1±14.1[a]	60.3±19.6[a]	71.9±15.2[b]	0.002
Zn intake (mg/day)	6.0±3.0	7.9±4.6	8.5±5.3	0.137
Zn level (µg/dl)	98.1±27.3[a]	113.3±38.3[a]	132.7±17.1[b]	0.001
Cu intake (mg/day)	0.44±0.16[a]	0.59±0.25[a]	1.1±0.39[b]	<0.001
Cu level (µg/dl)	97.0±33.5[a]	115.7±30.4[b]	137.2±28.8[c]	<0.001

^Analysis of variance test with post-hoc Tukey's honest significant difference. *Significant, homogenous groups had the same letter (a, b, or c).

The intake of energy was inadequate for most school-aged children and adolescents [30,31]. In our study, more than 50% of the undernourished children were taking unsafe levels of carbohydrates (55.3%) and calories (52.6%), and ~ 40% were taking an unsafe level of fat. Only 2.6% had an unsafe level of consumption of proteins. There was a significant difference in calories and fat intake of undernourished children and normal groups. On the contrary, most overnourished children recorded overconsumption levels of macronutrients; proteins, fat, and carbohydrates. Our results are consistent with that reported in several studies. In Kenya's periurban setting, only 17.3% of the schoolchildren aged 4–11 years received adequate energy [32]. In Libya, 76% of the schoolchildren met the RDA for energy [33]. However, in Mexico, 88.0% of the children have a sufficient amount of energy [33]. Overall, studies show that the amount of protein consumption is adequate for most of the children and adolescents [34,35]. In Libya, the mean intake of protein among schoolchildren was 226% of the RDA [32]. In Ghana, school-aged children achieved 100% of the RDA for protein in all age groups and sex [36].

Micronutrients play an important role in the different functions that are essential for healthy growth. Deficiencies during childhood can have acute and long-term effects on children's physical and mental health. Mineral intake among school-aged children and adolescents is mostly suboptimal in developing countries. Studies reported inadequate intake of iron, calcium, and zinc [32,37] as well as inadequate intake of phosphorus and magnesium [38]. In Uganda, for example, the average intake of calcium and zinc was 56 and 70%, respectively, of the RDA [39]. In this study, most undernourished children were taking unsafe levels of consumption of calcium. There was no difference in %RDA of microminerals between undernourished and normal children. Overconsumption of microminerals was obvious in overnourished children: iron, zinc, and copper. There was a significant difference in %RDA distribution between overnourished and normal children in zinc and copper. There was no significant difference between Zn intakes by the underweight, normal, and overweight. However, Zn average plasma level in the overweight children was highly significantly higher than that of the underweight and normal. The mean Cu and Fe intake by the overweight children and their average circulating levels were highly significant higher than that of the underweight and normal.

Regarding vitamin consumption, in our study, vitamin A deficiency showed similar prevalence between the different groups (40.9, 32.5, and 44.0% in the underweight, normal, and overweight groups, respectively). In a national study in the Philippines, an exceptionally high prevalence (40% or more) of vitamin A deficiency was found among 4500 children aged 6–12 years old [39] and also in a rural area from Burkina Faso [40]. Highest levels of vitamin A deficiency (50–90%) were reported among rural and urban poor African school-aged children in Botswana [41], South Africa [42], and Kenya[43] and among urban school-aged children in Hyderabad, India [44]. Both intake and plasma levels of vitamin B12 in the underweight, normal, and overweight children showed no statistical difference. Vitamin B12 deficiency accounted for 100% of the three groups. Vitamin D intake by the underweight normal and overweight children showed no statistical difference. However, its mean level in overweight children was highly significantly lower than those of the underweight and normal groups. There was a significant difference among the three groups in the prevalence of vitamin D deficiency.

Few studies have assessed the consumption of micronutrient intake by school-aged children in the Eastern Mediterranean Region. In Jordan, studies have shown that the mean intakes of iron, calcium, and vitamin A are 50, 70, and 65 − 80% of the respective RDAs [45,46]. In Lebanon, 73 − 88%, 84 − 95%, and 35% of school-aged children did not meet two-thirds of the RDA for calcium, vitamin D, and iron, respectively [46,47]. In KSA, calcium intake of children of 7 − 12-year-old, recruited from primary health care centers, was less than 60% of the RDA, and mean vitamin D intake was just 23% of RDA [47,48]. A national study, in the UAE, found that 80% or more of children aged 6 − 13-year-old did not have the corresponding estimated average requirement level for vitamin A, vitamin D, and, calcium. Available data revealed that pediatric anemia, vitamin A, and, vitamin D deficiencies remain a problem in the area. Dietary intake studies have reported inadequate intakes of calcium, iron, zinc, vitamin D, and vitamin A [47].

For most of the developing countries, food consumed by children and adolescents is inadequate in terms of energy, fats, and most micronutrients. On the contrary, some children consume more than enough calories and high-energy-dense foods, which lead to the increasing incidence of overweight and obesity in developing countries. Interventions aimed at alleviating this trend should therefore also be prioritized even as undernutrition is emphasized.

Conclusion

This study highlights a need for more dietary intervention strategies in school-aged children and higher-quality studies to assess nutritional status in this age group.

Micronutrient supplementation and fortification programs should be implemented to reduce the incidence of specific micronutrient deficiencies. Moreover, governmental and nongovernmental programs should focus on community development to ensure an acceptable level of social well-being that provides a healthy life for all families.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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