

Evaluation of physical health condition of primary school students in Abadan of Iran in comparison with WHO standard

Atefeh Zahedi¹, Sabrieh Khazni¹, Maryam Ban¹, Sajedeh Mousaviasl¹

¹ Abadan University of Medical Sciences, Abadan, Iran

Corresponding Author Atefeh Zahedi **Email:** zahedi@asaums.ac.ir

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ABSTRACT

This study aimed to investigate the physical condition of students in Abadan. This cross-sectional study was conducted on 3522 elementary school students in Abadan city in 2018. The participants were selected using convenience sampling and based on the cooperation of schools. Students' health status, height, weight, and body mass index (BMI) were assessed. Data analysis was performed using SPSS with descriptive and analytical tests, such as Chi-square and One-sample t-test. The majority of students had good nail and hair hygiene. Only 37% of the students had no decayed teeth. Besides, 32.70% of female students and 5.20% of students were infected with Pediculosis. Nail health was also better among male students than females. Furthermore, 73% of the students had healthy eyes. The average height of girls at the ages of 7, 8, 11, and 12 and the height of male students at the ages of 10 and 11 was less than the world health organization (WHO) child growth standards (p-value <0.05). The mean weight of girls at the age of 10 years and the mean weight of boys at the ages of 8, 9 and 10 years was higher than the WHO recommendation (p-value <0.05). BMI of male students at all ages except 7 and BMI of female students at 9, 10, 11, and 12 years was higher than the WHO recommendation (p-value <0.05). Due to the problems regarding health issues and nutritional factors of students and the impact of these problems on children's physical health, it seems that establishing training classes on children's physical health status and associated factors for students and parents and teachers may lead to early detection of these problems and improvement of students' physical condition.

Key words:

physical health condition; students; Abadan

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INTRODUCTION

In any country, students are the main assets to society, and paying particular attention to their health is the basis of maintaining or improving the general health of the whole society in the future¹. Basically, since childhood is the period of transition between infancy and adolescence, thus it is one of the critical stages of human development in which growth hormone mutations and physiological changes occur^{2,3}.

Each person's physical health reflects the proper functioning of his/her body organs, and to achieve this, each individual must be constantly monitored. One of the major places which are used in various countries, to monitor the health of children is the school⁴. Many factors influence students' academic accomplishment, one of the most significant of which is physical health. As a result, enhancing students' educational status through annual physical condition monitoring at the start of the school year is on the agenda of our country's educational system⁵. Any physical disorder and deviation in the development of students can have direct and indirect effects on their psychological development and academic achievement. Physical changes, such as height, weight, body mass, visual and auditory status, etc., are directly linked with the learning and training processes³.

Today, it is known that calculating the height and weight of primary school students can contribute to the determination of the nutritional status of individuals in a community. Short stature before puberty, in addition to hereditary difficulties, may be caused by economic and social poverty, which may be simply and economically avoided, according to researchers⁶. One of the main health concerns in the 21st century is obesity and overweight in children. According to health organizations reports in

2016, approximately 124 million children and adolescents were obese worldwide⁷. Childhood obesity is associated with the development of many diseases in adulthood, such as diabetes and cardiovascular disease⁸. In addition to being overweight, short stature can have devastating effects on a person's health either in a short or long term period. Short stature in women is associated with cardiovascular disease as well as child survival rates⁹.

Concerns about the status of public health, as well as the incidence of obesity and stunted development in children and students, have prompted the need for a single reference to track the health of children aged 5 to 19. Thus, World Health Organization (WHO) published an expanded standard and chart for monitoring the growth of children between the ages of 5 and 19 in 2007, which assesses children's height and weight to calculate BMI. These standards are defined as weight by age / sex, height by age / sex, and BMI by age / sex. If children's developmental status deviates from this chart, health evaluators and physicians will intervene to improve children's health¹⁰.

Davoodi et al. (2011) stated that the prevalence of short stature in primary school children was 6% in Hamadan city⁶. Adom et al. (2019) proposed that the prevalence of overweight and obesity was projected to be 10.5 percent in primary school children in Africa¹¹.

Tooth decay known as dental caries is one of the most common chronic diseases in humans due to the activity of microorganisms on the teeth¹², and is one of the chronic physical problems during childhood, i.e., WHO has announced the prevalence of this condition as 60 to 90%¹³. Due to discomfort, infection, early tooth decay, and chewing difficulties, dental decay can limit a child's food intake, affecting their growth, communication, and learning, as well as their participation in

vital daily activities.¹⁴ Dukic et al. indicated that the incidence of dental caries was higher in children aged 11-14 years than in children aged 7-10 years¹⁵.

Nail hygiene may affect the risk of many childhood infectious diseases. Intestinal parasitic infections are higher in children who do not wash their hands before eating or after using the toilet¹⁶. Nail-biting is one of the most common neurotic reactions in childhood which would increase the risk of infectious and parasitic diseases if hand and nail hygiene is not maintained¹⁷.

Lice are parasites outside the human body that are known to transmit typhus by sucking blood¹⁸. Pediculosis, which dates back to 25 million years ago, is a parasitic disease, mostly common among students aged 3-11 years¹⁹. In recent years, the prevalence of pediculosis was reported in students. Pediculosis is prevalent all over the world and is generally more common in girls than boys²⁰. In global studies on the global prevalence of pediculosis, the prevalence of this infection was reported from less than 10 to more than 40% among primary school children²¹.

Refractive errors and amblyopia are among the most common problems of students, which adversely affect reading, writing and learning abilities in terms of reduced visual acuity²². According to the WHO, many children have visual impairment due to uncorrected refractive error, significantly impacting their learning ability²³. Opubiri et al. estimated the prevalence of uncorrected refractive errors as 2.20% amongst Nigerian children²⁴.

Since Abadan city, which is located in the south of Khuzestan province, had no comprehensive study conducted on the physical health condition of primary school students, and most of the studies have focused only on a single particular part of the physical health of students; on the other hand, it is a city which was at war for 8 years, and the people of this region are economically poor, the researchers of this

paper decided to investigate the physical condition of elementary students in terms of height, weight, teeth, etc. to describe the aspect of physical health of students, and partly help policymakers and corresponding managers in this area.

METHODS

This cross-sectional research was conducted in 2018 to assess the physical health of elementary school children in Abadan. Schools were chosen by convenience sampling, which entails surveying just those schools that are willing to work with us. Then, all students of all schools were examined. Before entering the schools, an introduction letter was provided to Abadan Education Organization, to obtain permission to attend schools, and a consent was obtained from the school principal. This research has received an ethics code from Abadan University of Medical Sciences. The required data were collected using tools, such as a health checklist, tape measure, scales, Snellen chart, torch, abaisse-langue and disposable gloves. The health checklist included items for the visual acuity of the right eye, left eye, hair health status for either presence or absence of pediculosis, oral health and the number of decayed teeth, height, weight, and BMI. Before data collection, students were explained about the objectives of the study and how to perform the examinations; then, all students were examined. The duration of each student's examination was 20 minutes. Students' height and weight were assessed using the same tape measure and scale. Students' height (cm) was measured without wearing shoes and standing next to the wall. Weight (kg) was assessed with minimal clothing and no shoes. The visual acuity of each student was measured using a Snellen chart at a 4-meter distance, with instruction provided for each student in a well-lit room, with the right eye being examined first, followed by the left eye (by covering the opposite eye with the

student's hand). To examine the hair, the researcher used a pair of disposable gloves for each student and examined the whole head, especially the hairline near the neck and behind the ears, for pediculosis (presence of lice or its eggs) using an abaisse-langue. All teeth were inspected for the presence of dental caries using a torch and an abaisse-langue while the student was keeping his mouth open. Students' nails were examined for shortness and physical health. Students with long, dirty nails or with the fungal disease were considered to have nail health problems. The collected data were analyzed using SPSS version 24.0 with descriptive statistics such as frequency, percentage, mean and standard deviation, and analytic statistics, including Chi-square and one-sample t-test to compare the average height, weight, and students' BMI was according to WHO Child Growth Standards (WHO-CGS)²⁵.

RESULTS

3522 elementary school students were investigated, of whom 46.60% were girls and 53.40% were boys. The mean and

standard deviation of age in the students was 9.56 ± 1.69 with an age range of 7 to 12 years. The number of students in each age group was: 7(563), 8(530), 9(585), 10(620), 11(645), and 12(579). The majority of the students had healthy nails (98.10%) and hair (82.10%). Regardless of gender, 43% of the students had good oral health, and only 37% of the students had no decayed teeth, while the rest had at least one decayed tooth. By gender, 29.90% of girls and 43% of boys had no decayed teeth. The mean number of decayed teeth was 2.02 ± 2.17 in female students and 1.70 ± 2.13 in male students.

Male students had much better hair hygiene, indicating a substantial difference between male and female students. Furthermore, 32.70% of the female students and 5.20% of the male students were infected with head lice. Nail health was better among male students than in female students. Moreover, 73% of the students had healthy eyes. Respectively, in male and female students, 49.60 and 89.10% had healthy right eyes, while 54.40 and 88.20% had healthy left eyes. In terms of visual status, male students had better visual acuity (Table 1).

Table 1. The evaluation of study variables in male and female students

Variable		Gender F(%) / $\mu \pm \sigma$		p-value
		female	male	
Hair hygiene	yes	1093(67.3)	1783(94.8)	<0.001
	no	531(32.7)	97(5.2)	
Nail hygiene	yes	1568(96.8)	1866(99.3)	<0.001
	no	52(3.2)	14(0.7)	
Right-eye vision loss	yes	711(50.4)	204(10.9)	<0.001
	no	814(49.6)	1676(89.1)	
Left-eye vision loss	yes	696(45.6)	222(11.8)	<0.001
	no	829(54.4)	1658(88.2)	
Decayed teeth	yes	1129(70.1)	1071(57)	<0.001
	no	481(29.9)	809(43)	
Weight		32.82 \pm 11.77	32.49 \pm 11.23	0.39
Height		135.79 \pm 12.81	134.88 \pm 10.97	0.02
BMI		17.35 \pm 4.03	17.47 \pm 3.98	0.39

The mean weight, height, and BMI of students by gender at each age level (7, 8, 9, 10, 11, and 12 years) were compared with WHO-CGS. The mean and standard deviation of height in female and male students were 135.79 \pm 12.81 and 134.88 \pm 10.97, respectively. The mean height of girls at the ages of 7 (p-value = 0.05), 8 (p-value >0.001), 11 (p-value = 0.001) and 12 years (p-value = 0.004) were significantly lower than WHO-CGS. However, no significant difference was observed

between 9- and 10-year old students (p-value > 0.05). The highest difference between the height of female students and the standard rate was seen at the age of 8 years. There was a significant difference among male students at the ages of 9 (p-value >0.001), 10 (p-value = 0.05), and 11 years (p-value >0.001), so the height of male students at the age of 9 was higher than WHO-CGS, and lower than WHO-CGS at the ages of 10 and 11 years (Figure 1).

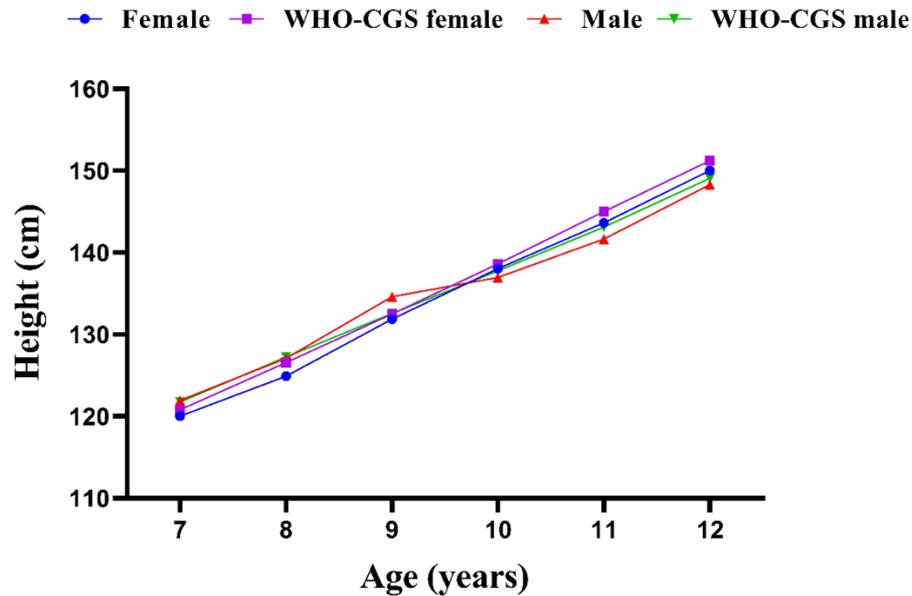


Figure 1. The comparison of the mean heights of male and female students with WHO-CGS

The mean and standard deviation of weight in female students was 32.82 ± 11.77 and in male students was 32.49 ± 11.23 . The mean weight of girls was higher than WHO-CGS only at the age of 10 years (p -value = 0.003), and there was no significant difference in other ages. The mean weight of boys at the ages of 8 (p -value = 0.03), 9

(p -value >0.001) and 10 years (p -value >0.001) was higher than WHO-CGS recommendations (Figure 2). Due to the lack of WHO standard weights for 11 and 12-year-old boys, comparisons were only made in the weight chart until the age of ten years.

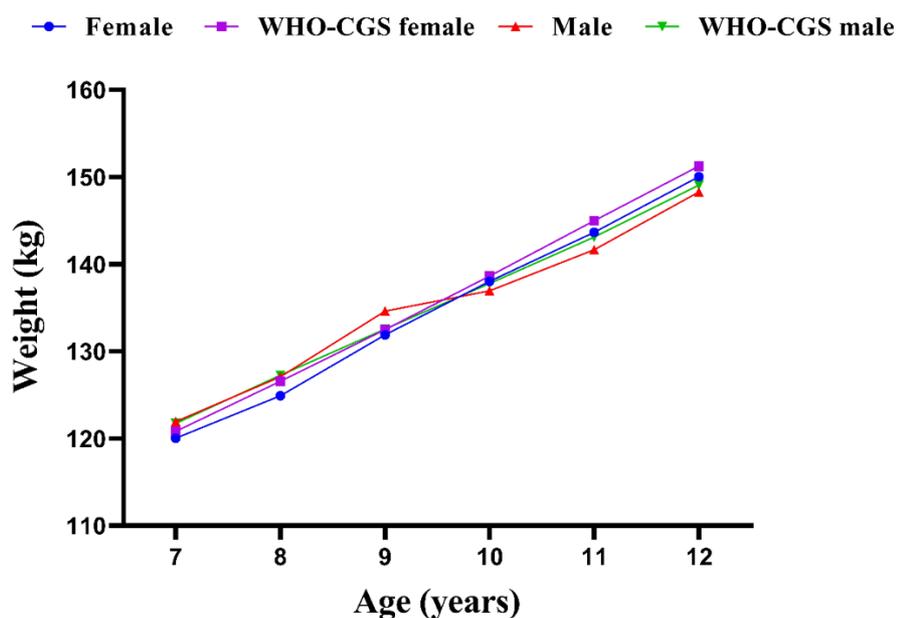


Figure 2. The comparison of the mean weights of male and female students with WHO-CGS

The mean and standard deviation of BMI was 17.35 ± 4.03 and 17.47 ± 3.98 in female and male students, respectively. The BMI of male students was lower than WHO-CGS only at the age of 7 years (p -value = 0.07), and at other ages, it was significantly higher than WHO's standard level (p -value <0.05). BMI of female

students at the ages of 7 and 8 years was not significantly different from WHO-CGS (p -value > 0.05), while at the ages of 9 (P -value = 0.03), 10 (p -value = 0.001), 11 (p -value >0.001) and 12 years (p -value >0.001) the BMI was higher than WHO-CGS (Figure 3).

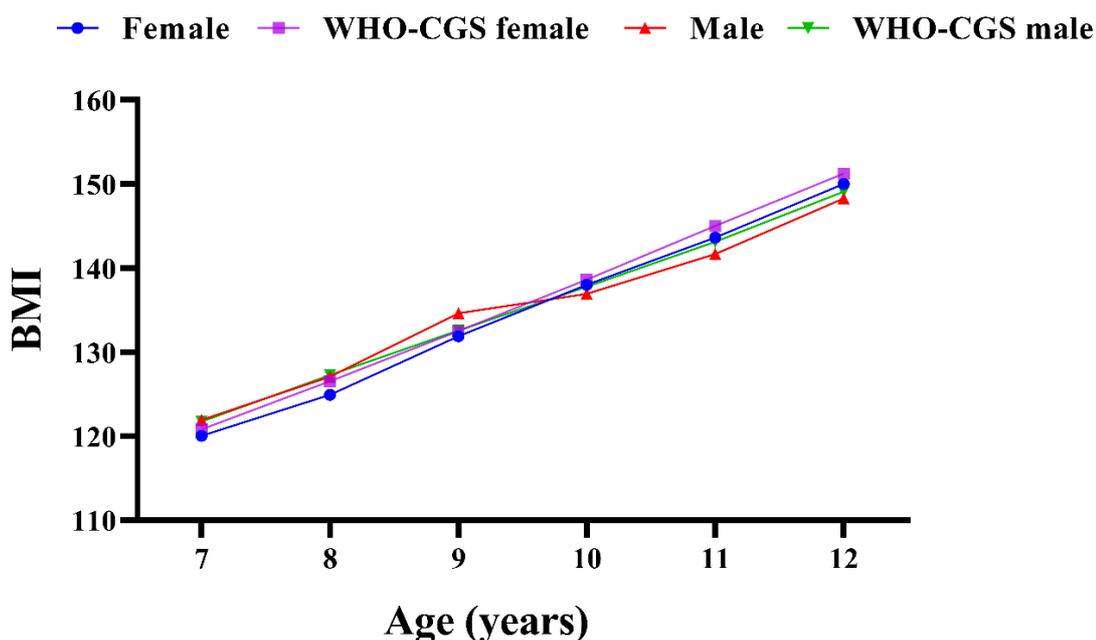


Figure 3. The comparison of the mean BMI of male and female students with WHO-CGS

DISCUSSION

The present research aimed to evaluate students' health and physical condition and compare it with WHO-CGS. Since students of school age do not pay much attention to personal hygiene, and also, the fact that schools are one of the most crowded places, they are exposed to lice infestation, thus the schools are one of the important places which can help initiate lice outbreaks²⁰, and screening for elementary school students to control and prevent lice outbreak seems essentially crucial. In this research, 5.20% of male students and 32.70% of female students were infected with head lice. Farahmandfar et al. stated that female students (9%) were

more likely to get infected with lice than male students (4.20%), with the highest infection rate in the third grade of elementary school²⁰. In a study on pediculosis prevalence, 12.17% of the students were infected with lice, with the highest frequency in the second grade (22.60%), and the lowest in the fourth grade (12.34%)²⁶. Haidarpour et al. proposed the prevalence of head lice in female students as 19.90%²⁷, and in northern Khuzestan, 10.50% of the students had head lice, which was more common in female students than male students (14.39% vs. 6/06%)²⁸. The prevalence of lice infection among primary school students was 14% in Iraq²⁹ and 65.70% in Ethiopia¹⁸. In Turkey, 11.10% of the students were infected with lice eggs,

and 0.04% were infected with lice¹⁹. Head lice are present in both girls 'and boys' schools, it is necessary to regularly inspect the students' hair, especially in cold seasons when male students wear hats. In most of the studies, the prevalence of lice was higher in female students due to their long hair and the habit of wearing the scarf in Iran and Islamic countries, which easily causes the transmission of infection through contact with scarves or hats.

In the present study, two-thirds of girls and slightly more than half of the male students had at least one decayed tooth. The mean number of decayed teeth in girls was 2.02 ± 2.17 and 1.70 ± 2.13 in females and males, respectively. Babaei et al. conducted a study in Mazandaran, and found the mean number of decayed teeth as 4.02 ± 8.93 , and there was no difference between male and female students¹². In a study in India, the prevalence of Decayed, Missing, and Filled Teeth (DMFT) in primary teeth was over 70%, and DMFT ranged from 19% at ages 6-7 years to 68% at ages 10-11 years in permanent teeth³⁰. The study conducted on Egyptian students (2019) showed that children had a mean DMFT of 3.23 ± 4.07 , and a mean DMFT of 1.04 ± 1.56 ³¹. In a study conducted in Australia, 50.60% of children aged 5-11 years had a DMFT score of one or more, and 49.40% had a zero score of DMFT³². These results indicated that Abadan students were in a better position in terms of the average number of decayed teeth than Mazandaran and Egyptian students, while lower compared to Australian students. Because primary teeth serve as a foundation for the emergence of permanent teeth between the ages of 6 and 12, it is crucial to practice good oral hygiene and learn how to brush your teeth correctly at this age to avoid permanent tooth decay.

There was a significant difference between girls and boys in terms of refractive errors in the present study. Refractive errors in the right (50.40% vs.

10.90%) and left eye (45.60% vs. 11.80%) were higher in girls than in boys. Accordingly, Karimi et al. showed the prevalence of refractive errors in students as 33%, and 2.38% of the students were wearing glasses³¹. In a study conducted in the south of Mashhad city, the prevalence of visual impairment was 23% in female students³. Ban et al. in Abadan villages, demonstrated the prevalence of refractive errors as 22.98% in female students and 17.55% in male students⁴. According to these investigations, female students in Abadan had a substantially greater rate of refractive errors than students in other places. Since students' visual acuity is one of the main factors associated with students' learning and concentration in the classroom, it is very important to take visual acuity into account and regularly monitor the students' vision status, and inform parents for further follow-up.

Long nails can be a suitable place for accumulating various substances and microorganisms, such as bacteria and worm eggs³⁴. However, because of the close proximity of primary school pupils, these infectious agents may quickly spread to others, making it critical to maintain nail cleanliness and trim them to avoid the spread of parasitic diseases. Karimi et al. reported the nail disorder as 7%³³. In the present study, the nail hygiene was 3.20% in female students and 0.70% in male students. In a study conducted in Indonesia, 32.94% of the students had good nail health, and 67.06% had poor nail health. In this Indonesian study, a significant relationship was observed between nail health and infection with parasitic infections¹⁶.

The assessment of children's development is a useful strategy to determine the health status of children which can be achieved by knowing the standards and comparing the developmental status of children with these standards³⁵. In this study, the height of

female students was lower than WHO standards, and there was no significant difference between the ages of 9 and 10 years. The height of male students displayed no definite pattern compared to WHO-CGS. Besides, there was no significant difference between the ages of 7, 8, and 12 years. We found that short stature was more common in female students than in male students, according to WHO-CGS. In the research done by Vakili et al. in public and private schools in Yazd, all heights for age percentiles in both genders were higher than WHO standard.³⁵ In a study conducted in Jordan on children aged 6-17 years, the prevalence of short stature was 4.90% in students⁹. EL-Shafie et al. also investigated primary school students in Egypt, and reported that 17% of children were short, 3.90% were tall, and female students had higher height than male students³⁶. The genetic and environmental factors are determinants of height, in order to solve the short stature problem among students and partly reach WHO-CGS, it is necessary to provide an appropriate education in schools regarding nutrition and nutritional value of food materials consumed by students in school. Moreover, special attention should be given to the nutritional status of the children at home.

The average weight of female pupils in this research was comparable with WHO-CGS, with no significant differences except at the age of ten years, which was greater than WHO-CGS. However, the weight of male students aged 8, 9, and 10 years was higher than WHO-CGS. In a study conducted in Ukraine according to WHO criteria, 5.90% of girls aged 6-12 years were underweight and 14.50% were overweight, also 4.50% of the male students were underweight, and 19.20% were overweight³⁷. In Palestine, 7.30% of children were underweight, and 14.50% were overweight³⁸. In a study conducted in Jordan, the prevalence of underweight was 5.70% and weight gain was 17.30%, which was higher in females than in males

(18.90% vs. 15.30%), and the prevalence of obesity was 15.70% which was higher among male students (18.90% in boys vs. 11.20% in girls)⁹. In Egyptian children, the prevalence of underweight was 8.20%, and weight gain was 12.20%³⁶. In Tanzania, the prevalence of underweight was 2.50% in children aged 8-10 years and 9.90% in children aged 11-13 years. Furthermore, the prevalence of weight gain was 24% and 7.80%, in the former and latter groups, respectively³⁹. According to WHO definition, in a study conducted in 21 European countries on children aged 6-9 years, the prevalence of severe obesity varied from 1% in Swedish and Moldovan children to 5.50% in Maltese children⁷. In a review study conducted by Mohammadi et al. in Iran, the prevalence of underweight among Iranian children was 15.5%, with the highest prevalence in Birjand and Zahedan cities (68.60%)⁴⁰. Vakili et al., found that the third and fiftieth percentiles of weight for age were in accordance with WHO-CGS, whereas the 97th percentile was higher than WHO-CGS³⁵. In most of the mentioned studies, the prevalence of weight gain was higher than underweight. In the present study, the female students had no weight problems, while male students gained weight. Therefore, it is necessary to pay more attention to the nutritional status of children; besides, the process of weight gain in children should be examined more carefully because being underweight can be associated with a lack of nutrients; on the other hand, health problems such as atherosclerosis develop at an early age and predispose to cardiovascular disease, people who are gaining weight should be given special care to reach their ideal weight.

The body mass index of male and female students in this research was greater than WHO-CGS at all ages. Because height and weight are two elements that influence BMI, the higher BMI in female students was owing to their short stature compared to WHO-CGS, and the higher BMI in male

students was related to their weight being greater than WHO-CGS. In Yazd city, BMI in both genders was different from WHO-CGS which is in both genders, the third percentile was lower than WHO standard BMI, and the fiftieth percentile in male students up to the age of 9 years was lower than WHO-CGS. Percentiles higher than 97 were higher than WHO-CGS. The third and fiftieth percentiles of BMI in 7-year-old girls were lower than WHO-CGS, while fiftieth and ninety-seventh percentiles for students over 7 years (excluding 8-year-old students) were higher than WHO recommendation³⁵. In a study conducted in Ukraine according to WHO classification, 23.10% of children aged 6-12 years had a BMI higher than normal, and 5.20% of children had a BMI lower than normal³⁷.

One of the limitations of this study was the sampling of schools available which was in terms of the non-participation of some schools in this study.

RECOMMENDATION

Short stature was common in girls, and overweight was common in boys. Therefore, BMI was higher than the standard WHO in both groups. Other health problems such as poor eyesight, tooth decay, poor hair, and nail hygiene were common among students, which may be in terms of poor nutrition and students' lack of awareness of health issues.

Since the physical health of children is affected by various factors including following health tips, proper nutrition and the level of awareness of children and parents towards health issues and children's health, etc., it is recommended to hold training classes in schools for the parents and teachers beside students, because parents, especially mothers, as well as teachers, due to close and long contact with students, can realize health and physical problems of the students faster and much

better. Therefore, early identification of these students is an effective strategy to solve their problems faster and easier; thus, improved awareness of mothers and teachers and students plays a magnificent role in solving most types of students' problems.

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