

Original Article



Assessment of Lifestyle and Eating Habits among a Nationally Representative Sample of Iranian Adolescent Girls: the CASPIAN-V Study

Ramin Shayan-Moghadam, MD¹; Motahar Heidari-Beni, PhD^{1*}; Roya Riahi, MSc¹; Mohammad Esmail Motlagh, MD²; Shahin Fesharaki, MD³; Ramin Heshmat, MD⁴; Seyede Shahrbanoo Daniali, PhD¹; Roya Kelishadi, MD^{1*}

¹Child Growth and Development Research Center, Research Institute for Primordial Prevention of Non-Communicable Disease, Isfahan University of Medical Sciences, Isfahan, Iran

²Pediatrics Department, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

³Student Research Committee, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

⁴Chronic Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

Abstract

Background: The present study assess lifestyle and eating habits of Iranian adolescent girls.

Methods: This cross-sectional study was conducted on 3207 adolescent girls, aged 12–18 years. Lifestyle and eating habits of adolescents were assessed.

Results: The prevalence of overweight was 11.3% and that of obesity was 10.2%. The frequencies of daily intake of fruits, dairy products and vegetables were 60.9%, 45.6 % and 33.5%, respectively. Skipping breakfast (15.8%) was more frequent than skipping dinner or lunch. Moreover, 10.6% of subjects had fast food daily and 16.2% had fast food weekly. Overall, 55.2% of participants watched television for at least 2 hours a day; and 27.1% reported to have a sleeping time of less than 8 hours a day. Low physical activity, i.e. less than 30 minutes per day, was less frequent among participants with high socio-economic status (SES) compared to those with medium or low SES (57.6% vs. 61.3% and 64.1%, respectively, *P* value = 0.010).

Conclusion: Improvement of lifestyle habits should be considered in public health plans for health promotion of adolescent girls and the next generation. Primordial prevention of chronic diseases by improving healthy lifestyle of adolescent girls should be a national public health priority.

Keywords: Adolescent girls, Dietary behavior, Life style, Physical activity, Prevention

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Introduction

Adolescence is the transitional phase of development and growth between childhood and adulthood. According to the World Health Organization (WHO) definition, any person between 10–19 years of age is considered an adolescent.¹ It is a critical period of human life due to several physical, psychological, and emotional challenges. Several studies showed that female adolescents mostly have more problems than males during this period.² Lifestyle has a great effect on health and contributes to several nutritional, communicable, and non-communicable diseases throughout life.³ There are several changes in personal behaviors and habits during adolescence.⁴ Some of these alterations in adolescents' behaviors such as physical activity, dietary habits, smoking, and sleep duration have a

serious effect on their health during adulthood.⁵ Physical activity has a significant role in mental and psychological health of adolescents.⁶

Sleep quality and its duration are other critical issues during adolescence which have a great effect on mental health, brain development, cognitive system and learning and memory system. Adolescents tend to sleep shorter in comparison with children.⁷

Adolescents tend to consume salty and fatty junk foods and most of them have unhealthy dietary habits. These foods are poor in nutrients and affect the nutritional status of females during the adolescence period and in pregnancy. Adolescents have more concerns about their body image and excess weight, especially female adolescents, which may cause failure to ingest optimal

*Corresponding Authors: Motahar Heidari-Beni, PhD; Department of Nutrition, Child Growth and Development Research Center, Research Institute for Primordial Prevention of Non-Communicable Disease, Isfahan University of Medical Sciences, Isfahan, Iran. Fax: +983137925280, Tel. +983137925284, Email: motahar.heidari@nutr.mui.ac.ir

Roya Kelishadi, MD; Department of Pediatrics, Child Growth and Development Research Center, Research Institute for Primordial Prevention of Non-Communicable Disease, Isfahan University of Medical Sciences, Isfahan, Iran. Fax: +983137925280, Tel. +983137925281, Email: kelishadi@med.mui.ac.ir

nutrients and energy which are necessary for rapid growth during the adolescence period. It also causes malnutrition, micronutrient deficiency and iron deficiency anemia.⁸

Sun exposure is another factor that is important during adolescence. It is the main source of cutaneous vitamin D production. Vitamin D is a crucial micronutrient in regulating the serum calcium level, bone metabolism, and bone health. Maintaining vitamin D in the standard level is very crucial, especially during adolescence.⁹ This fact shows the importance of sufficient sun exposure time for adolescents, especially adolescents girls in Iran which have less outdoor activity than boys. Adolescence is a critical period of life, especially in females. Healthy adolescent girls will become healthy adult females in the future. Adolescent girls have a significant role as future mothers in the growth and development of the next generation. So, healthy lifestyle in female adolescents is very important.

The present cross-sectional multi-center study assessed some of the main lifestyle and eating habits in Iranian adolescent girls.

Materials and Methods

Study Population

In the present study, the data of national school-based surveillance was used. The data was part of the fifth phase of the Childhood and Adolescence Surveillance and Prevention of Adult Non-communicable disease (CASPIAN-V) study. This study was performed among primary and secondary schools students (7–18 years) in urban and rural areas of 30 provinces of Iran. Protocol details of the CASPIAN-V study have been explained previously.¹⁰

Data Collection

In the present study, data from 3,207 adolescent girls were assessed. The age range of participants was 12–18 years.

Demographic characteristics, weight status, physical activity, dietary habits, sleep patterns, television watching, personal computer (PC) working time, duration of mobile use and duration of sun exposure were assessed.

These data were obtained from two sets of validated questionnaires. One of the questionnaires was adopted from the World Health Organization's Global School Student Health Survey (WHO-GSHS) and was filled out through interviews with students; the second questionnaire including dietary habits, leisure time activities, and sleep pattern was completed through direct interviews with one of the parents. All questionnaires were checked for validity and reliability.^{11,12}

Frequency of intake of dietary groups such as vegetables (fresh or cooked vegetables), fruit (fresh fruit, dried fruit, fresh fruit juice, packed fruit juice), dairy products (milk, yogurt, cheese), fast food (sausages, burgers and pizza), salty snacks (snacks, chips and pretzels), sweets (cakes, cookies, pastries, biscuits and chocolate), sugar, and drinks

(carbonated drinks, diet sodas, non-alcoholic beer, tea, coffee) was asked for assessment of dietary habits.

A calibrated scale was placed on a flat ground and weight was measured to the nearest 0.1 kg. Height was measured using a portable stadiometer to the nearest 0.1 cm. Waist circumference was measured at the midway point between the lower border of the rib cage and the iliac crest at the end of normal expiration.

The number of hours per day watching television and/or videos, using a personal computer or playing electronic games was asked for assessment of screen time (ST) behavior. Based on this data, the total cumulative time spent as ST was calculated. Two categories were defined for ST: less than 2 h/d was considered as low, and 2 h/d or more was considered as high group

The average hours per day spent for sleeping on weekdays and weekends were considered for sleep duration. Sleep duration equal to or less than 8 h/day was defined as short sleep duration. The onset of sleep was occasionally asked.

The data on frequency of leisure time physical activity outside the school during the preceding week was collected using a validated questionnaire.¹¹ Students were considered having adequate physical activity if they had exercises for at least 30 minutes per day that led to sweating and a substantial increase in respiratory or heart rate. Two questions were used for assessment of physical activity. The number of days of physical activity for an overall 30 minutes per day and physical education classes at school per week were questioned. Physical activity less than 30 min per day was defined as low and physical activity more than 30 min per day was defined as sufficient.¹³

Evaluation of sun exposure was done using the WHO questionnaire. The parts of the body exposed to sunlight, the time of exposure to outdoor sunlight and the use of sunscreen creams on weekdays and weekends were asked

Feeling worthless, confusion, nervousness, anxiety, having a poor sleep during the 6 preceding months and feeling depressed and worried during the past 12 months were assessed by seven multiple-choice Likert-scale questions. Quantitative values of mental status score were determined by the sum of scores divided by seven. The range of mental status score was 1 to 4.71, with higher scores showing better mental status.

The principal component method was used for socio-economic status (SES) assessment. Jobs and education of father and mother, owning a car and computer, and type of student's school (private, public) were asked. Three categories were considered for SES: low (first tertile), medium (second tertile) and high (third tertile).

Statistical Analysis

The SPSS statistical package (SPSS, Chicago, IL; version 18:0) for windows was used for analyzing the data. Quantitative variables were shown as mean \pm standard deviation (SD). Qualitative variables were shown as

frequency (percentage). The chi-square test was used for comparison of demographic variables and lifestyle factors among various levels of SES. *P* values of less than 0.05 were considered as statistically significant.

Results

The demographic characteristics of the adolescent girls are shown in Table 1. The mean (SD) age of girls was 15.2 (1.72) years. The prevalence of obesity was 10.2% and abdominal obesity was 20.4% among Iranian adolescent girls.

The food and snack consumption of the adolescent girls is shown in Table 2. The frequency of daily consumption of fruits (60.9%), vegetables (33.5%), and dairy products (45.6%) was higher than sweet snacks, salty snacks, carbonated drinks and fast food.

Table 3 presents the lifestyle habits of Iranian adolescent girls. Among the main meals, skipping breakfast (15.8%) was more common than lunch and dinner. Also, 55.2% of the girls watched television for 2 hours or more per day.

As shown in Table 4, anger (42.8%) followed by worry (38%) were more frequent among Iranian adolescent girl than other psychological disorders. In addition, 28.6% of the adolescent girls perceived themselves as overweight or obese while having normal weight.

The frequency of lifestyle factors of participants according to SES is shown in Table 5. Low physical activity, i.e. less than 30 minutes per day, was less frequent among adolescent girls with high SES compared to those with medium or low SES (57.6% vs. 61.3% and 64.1%, respectively). The frequency of consuming food items

was not significantly different according to the SES of participants (*P* value > 0.05).

Discussion

This nationwide study assessed some lifestyle habits including dietary and physical activity habits among Iranian adolescent girls.

In this study, the prevalence of overweight was 11.3% and that of obesity was 10.2%. In Asian adolescents, the prevalence rates of overweight and obesity are reported at 13.7% and 6.2%, respectively.¹⁴ A large study conducted among American children and adolescents showed that the prevalence of obesity was 16.9% and that of overweight was 31.8%.¹⁵ In a large cross-sectional survey on US youth, an escalating trend of obesity was

Table 1. Demographic Characteristics of Iranian Adolescent Girls

Variables		Mean	SD
Age (year)		15.2	1.72
Weight (kg)		51.53	13.41
Height (cm)		157.10	9.89
Waist circumference (cm)		71.28	10.31
		No.	%
Living area	Urban	2553	79.6
	Rural	654	20.4
Socio-economic status	Low	1007	32.8
	Medium	1002	32.7
	High	1057	34.5
Father's education	Illiterate	388	12.6
	Diploma/under diploma	2245	72.8
	Academic education	449	14.6
Mother's education	Illiterate	538	16.9
	Diploma/under diploma	2307	72.5
	Academic education	335	10.5
Weight status	Underweight	386	12.1
	Normal weight	2110	66.4
	Overweight	359	11.3
	Obese	323	10.2
Abdominal obesity	No	2553	79.6
	Yes	654	20.4

Table 2. Food and Snack Consumption of Iranian Adolescent Girls

Food items		Daily	Weekly	Rarely	Never
Sweet snacks	No.	715	1308	1102	82
	%	22.3	40.8	34.4	2.5
Salty snacks	No.	205	877	1663	451
	%	6.41	27.44	52.03	14.1
Carbonated drinks	No.	100	770	1504	829
	%	3.1	24	47	25.9
Fruits	No.	1668	729	239	104
	%	60.9	26.6	8.7	3.8
Vegetables	No.	1061	1480	439	186
	%	33.5	46.7	13.9	5.9
Dairy products	No.	1462	1238	470	35
	%	45.6	38.6	14.7	1.1
Fast food	No.	339	520	1762	581
	%	10.59	16.24	55.03	18.14

Table 3. Lifestyle Habits of Iranian Adolescent Girls

Lifestyle Habits		No.	%
Breakfast	Non skipper	2662	84.2
	Skipper	501	15.8
Lunch	Non skipper	2900	91.4
	Skipper	272	8.6
Dinner	Non skipper	2884	90.4
	Skipper	306	9.6
Sleep duration	< 8 h/d	847	27.1
	≥ 8 h/d	2284	72.9
Sun exposure	< 5 min/d	520	16.3
	1-30 min/d	1397	43.9
	> 30 min/d	1267	39.8
Television watching	< 2 h/d	1435	44.8
	≥ 2 h/d	1769	55.2
Personal computer use	< 2 h/d	2813	89.8
	≥ 2 h/d	320	10.2
Mobile use	< 2 h/d	2975	95.1
	≥ 2 h/d	154	4.9
Physical activity	< 30 min/d	1239	38.9
	≥ 30 min/d	1943	61.1

Table 4. Psychological Behaviors Among Iranian Adolescent Girls

		No.	%
Worthlessness	Low	2687	84.9
	High	478	15.1
Anger	Low	1808	57.2
	High	1354	42.8
Worry	Low	1966	62
	High	1206	38
Insomnia	Low	2411	76.3
	High	747	23.7
Fatigue	Low	2876	90.9
	High	288	9.1
Depression	Low	2541	80
	High	637	20
Anxiety	Low	2930	92.6
	High	234	7.4
Self-perceived health	Good	2510	78.9
	Poor	670	21.1
Life satisfaction	Satisfy	2482	77.6
	Dissatisfy	716	22.4
Weight perception	Underestimate	900	28.3
	Right weight	1369	43.1
	Overestimate	908	28.6

documented from 2007 to 2016. This study reported that the prevalence rates of obesity and severe obesity were 20.6% and 7.7%, respectively in 2016.¹⁶ In recent decades, changes in dietary patterns, including increased intake of soft drinks and sweets, as well as decreased intake of fruits and vegetables in many countries have led to a rapid rise in the prevalence of excess weight in childhood and adolescence. In spite of the changes from healthy diet

to unhealthy dietary habits, some studies have not found any association between obesity and intake of fruits, vegetables, and soft drinks. There was a significant reverse association between consumption of sweets and body mass index in 31 out of the 34 countries that were examined (91%).¹⁷ Increasing sweet consumption was correlated with decreasing likelihood of overweight. A possible explanation is that underreporting unhealthy food intake may be more common in overweight people in comparison with normal weight people. Another possibility is that the youth who consume sweets, eat less fatty foods including potato chips and pastries. Therefore, as fats have more caloric density compared with carbohydrates, their total caloric intake might have been decreased.¹⁷

The current study showed that 27.1% of Iranian adolescent girls slept for less than 8 hours a day. Short sleep duration and poor sleep quality are very common among adolescents. There is significant change in circadian rhythm in adolescents due to changes in their lifestyle, academic concerns, growing time of cellphone usage, participating in social programs and decreasing parental supervision. The prevalence of sleep problems during adolescence is about 25% to 50%.¹⁸ The prevalence of insomnia among adolescents was 14.9% to 27% based on the accuracy of insomnia definition.¹⁹

Decreasing sleep hours is common in adolescents in both developed and developing countries. Sleep problems cause several mental health diseases. They lead to poorer school performance, problems in cognitive development, several physical problems, and chronic diseases throughout life. These facts indicate the importance of sleep hygiene during adolescence.^{20,21}

Table 5. Frequency of Food Items Intake And Lifestyle Habits According to the Socio-economic Status

		Socio-economic Status			P Value
		Low	Medium	High	
Fruits	Daily	498, 59.1%	532, 61.8%	575, 61.9%	0.401
	Non-daily	345, 40.9%	329, 38.2%	354, 38.1%	
Vegetables	Daily	319, 32.1%	336, 33.8%	361, 34.8%	0.443
	Non-daily	674, 67.9%	659, 66.2%	677, 65.2%	
Dairy products	Daily	377, 37.5%	367, 36.7%	420, 39.8%	0.327
	Non-daily	629, 62.5%	634, 63.3%	636, 60.2%	
Fast foods	Daily	118, 11.7%	106, 10.6%	101, 9.6%	0.291
	Non-daily	888, 88.3%	896, 89.4%	952, 90.4%	
Sweets snacks	Daily	222, 22.0%	213, 21.3%	224, 23.1%	0.612
	Non-daily	785, 78.0%	789, 78.7%	813, 76.9%	
Salty snacks	Daily	73, 7.3%	60, 6.0%	62, 5.9%	0.360
	Non-daily	929, 92.7%	941, 94.0%	991, 94.1%	
Carbonated drinks	Daily	39, 3.9%	27, 2.7%	31, 2.9%	0.283
	Non-daily	968, 96.1%	973, 97.3%	1025, 97.1%	
Physical activity	Low (< 30 min/d)	624, 64.1%	612, 61.3%	601, 57.6%	0.011*
	High (≥30 min/d)	359, 35.9%	386, 38.7%	443, 42.4%	
Screen time	Low (<2 h/d)	826, 84.1%	814, 82.9%	839, 81.1%	0.211
	High (≥2 h/d)	156, 15.9%	168, 17.1%	195, 18.9%	

The present study showed that 33.5% of Iranian adolescent girls had daily vegetable intake, and 60.9% consumed fruits everyday. A Study in the USA showed that 28.5% of the middle school students did not consume fruit daily and 33.2% of students did not consume vegetables daily.²² Sufficient intake of fruits and vegetables is important because they are efficient sources of antioxidants and they also have an important role in prevention of non-communicable diseases.²³

Our findings showed that 45.6% of Iranian adolescent girls consumed dairy products everyday. Dairy products are an important part of a healthy diet. They have a significant role in preventing obesity, hypertension, cardiovascular disease and improvement of bone and tooth health. Dairy products are sources of calcium, which is a vital micronutrient during adolescence.²⁴ It is recommended that adolescents should consume at least 3 servings of dairy products a day. A large study on American adolescent girls showed that more than 90% of them did not consume the proper amount of dairy per day.²⁵ Furthermore, recent studies showed that the prevalence of dairy consumption has decreased in recent years, whereas consumption of soft drinks and juices has increased among adolescent girls.²⁶

According to our findings, fast foods were consumed 10.6 % daily and 16.2% weekly by Iranian adolescent girls. Obesity is one of the major concerns in the adolescence period. Consumption of fast foods and snacks is increasing in modern life and it is an undeniable reason for this problem.²⁷ Adolescents prefer to spend their time with people of the same age and they sometimes unintentionally consume fast foods because they want to spend time with their friends in fast food restaurants. Studies in Western countries showed that the prevalence of weekly fast food consumption was more than 70%.^{28,29} Lower prevalence of fast food consumption among Iranian adolescent girls compared to Western countries is probably due to the socio-cultural differences, especially in rural areas of different countries with less spending of time with friends in fast food restaurants.

We found that 84.2% of Iranian adolescent girls consumed breakfast regularly; it is higher than breakfast consumption in Western countries which is reported to be about 60% to 70%.^{30,31} Breakfast is the most important meal of the day, and has a significant effect on physical and cognitive development during the adolescence period. A growing body of evidence has documented the effects of breakfast consumption on reducing the risk of obesity and overweight.³² A study in rural and urban South African adolescents reported that 60% of participants had regular breakfast intake.³³ Likewise, a study in Turkey reported that 77.9% of students had breakfast every day.³⁴

In this study, we found that 61.1% of Iranian adolescent girls had physical activity for more than 30 minutes per day. In 2010, the WHO reported that only 16% of female adolescents are physically active worldwide.

Physical activity is one of the other significant parts of a healthy lifestyle. In recent years, the amount of physical activity has diminished in both developed and developing countries. Adolescents, especially female adolescents due to academic competitions and also participating in other social programs, have less time for healthy and sufficient physical activity.³⁵ Increasing the time spent on watching television, use of personal computers, and a reduction in physical activity in schools and communities have resulted in considerable change in the pattern of physical activity. American guidelines suggest 30–60 minutes of physical activity for young people on most or all days of the week. The Great Britain guidelines suggest at least 60 minutes of physical activity on at least 5 days a week. Canadian guidelines suggest gradually increasing daily physical activity to 90 minutes for adolescents.^{36,37} Physical activity levels among adolescents have been reported widely in different countries but most of them do not meet the sufficient levels.³⁸ In a large study on young German adults aged 14–24 years, Strohle et al³⁹ showed that only 41% of female adolescents had physical activity regularly. They also reported that adolescents with higher physical activity had a lower risk for some mental illnesses like depression. Interventions in physical activity should be considered as an essential component for reducing the global obesity epidemic. Sedentary behaviors in youth can be reduced by increasing opportunities for more physical activity in schools and community.

The growing prevalence of obesity and physical inactivity in adolescents is directly related to the increasing hours of watching television and playing video games. Watching television not only causes a significant decrease in physical activity but can also increase the consumption of snacks and high-calorie foods. According to our findings, 55.2% of Iranian adolescent girls spent more than 2 hours per day watching television. A study on American high school students reported that 42.8% of girls spent more than 2 hours a day watching television.⁴⁰ This difference may be due to religious differences and the lack of suitable promenade for Iranian girls, so they prefer to stay home.

Increasing peak bone mass during the adolescence period prevents bone diseases in adulthood and senescence, especially osteoporosis, and causes a significant decrease in osteoporotic fractures. Considering the higher prevalence of osteoporosis in women, receiving sufficient vitamin D is an important issue in adolescent girls. Radiation of ultraviolet (UV) B wave band starts the primary phase of vitamin D3 synthesis in the human body and is the main source of vitamin D.⁴¹ We found that 16.3% of Iranian adolescent girls have less than 5 minutes of sun exposure per day and 60.2% receive sunlight for less than 30 minutes per day. In a study on adolescents in the southern part of Spain, Fernandez et al⁴² reported that only 11.1% of female adolescents received sunlight for less than 1 hour. Girls spent less time outdoors on weekends and received

less sunlight than boys. The socio-cultural differences between Iran and Western countries such as Spain can be the reason for the difference in sun exposure.

According to studies, the greatest sun exposure occurs before the age of 20 among 13–19-year-old adolescents with longer exposure times on weekends and during summer vacation. Sunlight exposure is important for vitamin D synthesis. However, a high prevalence of vitamin D deficiency has been reported in sunny areas of Middle Eastern countries. Dietary consumption of vitamin D is essential when sun exposure is inadequate. However, dietary sources for providing the daily recommended requirement of vitamin D are low. One of the main factors that affect the percentage of the ground level of ultraviolet B (UVB) is air pollution. The amount of solar UVB that reaches the earth surface is inversely correlated with the amount of air pollution. Thus, air pollution should be considered as a risk factor for hypovitaminosis D.^{43,44}

In the present study, there were no differences in intake of food items among adolescent girls according to their SES. Our findings are not consistent with a study on 162 schools (25309 students) in Greece which showed that children and adolescents in medium or high SES families had better diet quality with more consumption of fruits, vegetables, and dairy.⁴⁵

The positive association between SES and being more physically active in the present study is in agreement with findings from some previous studies.⁴⁶ Habitual physical activity level was lower among low SES Brazilian children.⁴⁷ One study on 6–8-year-old girls found that supervised physical activity and organized sports increased with higher family income and education levels. Likewise, higher SES was associated with lower television time in German children and adolescents.⁴⁸ However, in the current study, there was no difference in screen time according to the SES of participants.

Regional and national organizations and international agencies must cooperate for prevention of unhealthy lifestyle in adolescents. Physical activity and healthy diets should be encouraged in school-age youth. A new approach and modern tools are needed to promote changes in lifestyle of adolescents more effectively. Regarding proper weight control, healthcare staff should recommend healthy food items without any compulsion because adolescence is a unique period in life. Computer-tailored education is an efficient way for changing the lifestyle and increasing motivation for adopting a healthy diet and physical activity. According to the findings, computer-tailored education is more effective than general education in adolescents.⁴⁹

In the present study, we assessed lifestyle factors and eating habits in a large sample of Iranian adolescent girls with different SES living in rural and urban areas. The large study population and their representativeness provide a realistic view on lifestyle habits of Iranian adolescent girls.

However, our study has some limitations. First, data of lifestyle variables and dietary habits were extracted from self-reported questionnaires, which probably reduces their accuracy. Second, we used 16 dietary groups for assessment of dietary habits without any information regarding the number of servings per day.

In conclusion, this large nationwide study showed that the consumption of vegetables, fruits, and dairy products was lower than desirable levels among Iranian adolescent girls. Skipping breakfast, sleep problems, as well as low physical activity, especially in those with high SES, were among major unhealthy lifestyle habits. As adolescence is an important period of life for girls, affecting their current wellbeing as well as their future health and the health of the next generation, health promotion and improvement of lifestyle habits of adolescent girls should be underscored in health programs at individual and public levels.

Authors' Contribution

MHB and RK equally contributed to the conception and design of the research; RK, MEM and RH contributed to the design of the research; RR contributed to the acquisition and analysis of the data; RSM, MHB, ShF and SShD contributed to the interpretation of the data; and RSM and MHB drafted the manuscript. All authors critically revised the manuscript, agree to be fully accountable for ensuring the integrity and accuracy of the work, and read and approved the final manuscript.

Conflict of Interest Disclosures

None.

Ethical Statement

The study protocol was approved by ethical committees and other relevant national regulatory organizations. The present study was approved by the Research and Ethics Council of Isfahan University of Medical Sciences. We explained the objectives and protocols of the study and after that, written informed consent was obtained from the students and their parents.

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