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Research Article

# An Examination of the Body Weight Status amongst Iranian Secondary School Children Living in Kuala Lumpur, Malaysia

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**Received:** September 21, 2020; **Published:** September 30, 2020

## Abstract

Obesity is now a major global health concern contributing to a significant premature morbidity and mortality in adults. The rate of obesity in children and adolescence are increasing at an alarming rate with an outlook suggesting continued trend of obesity in childhood and adolescents for years to come. The primary cause of obesity is lifestyle change with a combination of increased high calorie intake and adoption of a sedentary lifestyle. This study examines factors contributing to obesity in a sample of 280 school aged expat Iranian children living in Malaysia. The finding from this study indicates that there is a direct relationship between disposable cash available to children as well as the increasing age with their body weight increase (higher BMI and obesity). There were no association between household income, or parental educational or occupational status suggesting little or no parental input in guiding their off springs towards a healthy diet. This together with availability of disposable cash provided a suitable environment for children and adolescents to practice an unhealthy dietary exercise leading to a higher BMI level.

***Keywords:*** *Adolescents; Healthy Dietary Intake; Obesity; Body Mass Index (BMI); Disposable Cash*

## Introduction

The prevalence of overweight and obesity in children and adolescence has been increasing at an alarming rate. The higher body weight in adolescence appears to be a key predictor of adulthood obesity [1]. Being an overweight during adolescence is a risk factor for a number of major health problems which include diabetes, cardiovascular diseases leading to premature morbidity and mortality [2]**.** Although obesity is a multifactorial disease, however, the lifestyle plays a crucial role in accumulation of adiposity and ultimately development of state of obesity. Interestingly, the lifestyle itself is influenced by several factors. Amongst a large array of factors affecting the lifestyle, family socio-economic status appears to have a marked impact on development of obesity in adolescents. In developed countries, lower socio-economic status is directly linked with obesity and its sequalae [3]. By contrast, obesity in children appears to be predominantly a problem of the rich population of the society and is directly linked with disposable income of a given family [4,5]. In other words, in developing countries, the rate of increase in overweight and obesity is directly proportional to higher economic growth and improved socio-economic status.

In Iran, a significant proportion of the increase in the prevalence of obesity is due to the economic growth. In a study, the prevalence of overweight and obesity in adolescents aged 12 - 18 years in one of the northern cities of Iran, were reported to be 10.9% and 11.3%, respectively [6]. Around the same time (2007), the prevalence of overweight among secondary school students aged 13 - 17 years in Malaysia were reported to be 8.3% [7], more than 3% less than that reported for Iranian students. In recent years, there has been a large influx of Iranians to Malaysia. There are now estimated > 50,000 Iranian expatriates living in Malaysia, predominately in Kuala Lumpur. The Iranian expatriate school age children largely attend the Iranian school in their host country thus developing a dietary/eating habit which is somewhat a compromise between their traditional dietary habit and that of host country.

## Aim of the Study

The aim of this study was to evaluate the impact of perceived dietary habit changes on body weight of the Iranian expatriate school age children.

## Material and Methods

### Study design and population

A cross-sectional study aimed at assessing factors associated with body weight status among Iranian adolescents studying in a Secondary and a High School in Kuala Lumpur. The study was conducted at Iranian Secondary and a High School in Ampang Point Kuala Lumpur. A total of 296 female and male adolescents aged between 12 and 18 years old were selected as respondents in the present study. The sample was determined using the formula:

$N = Z^2_{1-\alpha/2} P (1- P)/d^2$ $n = 1.96^2 (25\%) (1-25\%)/0.05^2$ ..... $n = 280$

N = Sample size

$Z^2_{1-\alpha/2}$ = 1.96 for a two- sided test at $\alpha$=0.05

P = Prevalence level

d = Accuracy level for estimating the prevalence for this study, d is (in proportion of one; if 5%, d = 0.05).

### Measurement tools

Anthropometric data: body weight and height were measured (measured twice for accuracy) and Body Mass Index (BMI) was calculated accordingly. The World Health Organization [8], cut off was used for calculating the Body Mass Index for age in 5 - 19 years. A self-administered questionnaire was used in this study to ascertain: 1) the socio- demographic characteristics, 2) level of physical activity, and 3) the dietary intake of the participants.

For composite dishes, the amount of each ingredient used in the recipe was estimated by the researchers. All food records were coded, and household recorded data were converted into food weights in grams based on a list of food weights according to Food Composition list by [9]. Food quantities and the weight of the foods consumed were converted and entered for analysis based on Malaysian food data bases using Nutritionist Pro™ software (First Data Bank, 2005). If cooked dishes of certain Iranian food were not included in the database of Nutritionist Pro™ Software, the investigator made an original recipe from standard cookbooks for each dish (per 100 gram) and then the quantitative information was entered to Nutritionist Pro™ software. If required, food recipes were obtained from participating families and the software was used to calculate average nutrient intake and relevant energy intake for each study subject.

### Study questionnaire

The questionnaire used in Socio-demographic characteristics, Physical activity were self-administrated, but the dietary intake was recorded through face-to-face interview with a research team member. In socio-demographic section, adolescents were asked to answer 11 questions on their demographic and socioeconomic backgrounds. This included their age, sex, grade level, parents' education, parents' job, number of siblings, length of residence, living arrangement (alone/with family/with a single parent), household income, pocket money and academic performance. Academic performance was cross referenced with academic record office in both schools. The Physical Activity Questionnaire for children (PAQ-C), which adopted from [10] was used to evaluate general level of physical activity of the adolescents.

Dietary intake was studied by using three different dietary methods. These methods were namely a 24-hour dietary recall for 2 days comprising one weekday and one weekend day using a food frequency questionnaire (FFQ) as described [11] and a meal pattern questionnaire. The data from 24-hour dietary recall for 2 days served as the reference method for assessing the dietary intake of the participants. The 24-hour dietary recall method was used to estimate the mean nutrient intake of the group [12]. To ensure complete and appropriate understanding of the study questions a mock questionnaire test (pre-test) session was conducted amongst 24 adolescents (12 male and 12 female) from the Iranian Secondary School in Kuala Lumpur. Importantly, the pre-test revealed that the respondents could understand almost all questions. Only a few questions that dealt mainly with physical activity required further explanation. Consequently, some modifications were done in the questionnaire. The reliability of pre-testing questionnaires was within acceptable level (Cronbach's alpha = 0.89).

All foods and beverages, including cooking methods were recorded by the research team. The subjects were asked to recall the exact type of foods and beverage consumed starting with breakfast until they sleep during the previous two days. The participants were asked to use standardized cups and spoons to estimate the quantity of food consumed. For composite meals, the amount of each ingredient used in the recipe was estimated by the researcher. All food intake records were coded by a special computer software programme as outlined above. The household measurements recorded were converted into food weights in grams based on a list of food weights according to food composition table by [9] and were analysed as outlined above.

### Data analysis

All the results were analysed using the Statistical Package for the Social Sciences (SPSS version 17.0 software). The average of energy and nutrients for the two days 24-hour dietary recall were compared to the Dietary Reference Intake (DRI). Energy and nutrient intakes such as protein, fat, fibre, vitamin A, C, D, thiamine, riboflavin, niacin, pyridoxine, folic acid, calcium, magnesium, iron, sodium, zinc, manganese, potassium, and phosphorus were assessed based on the Dietary Reference Intake (DRIs). The Dietary Reference Intake has all macronutrient except fat which is not determined (ND).

Descriptive statistics such as frequencies, means, standard deviations and percentages were used to describe variables. Cronbach's alpha was used to assess internal consistency of each scale in the questionnaire. The T-test was used to determine any significant difference in dietary intake, physical activity and BMI between male and female participants. For all categorical variable Chi-square was used in this study. Pearson Product-Moment Correlation was used to determine association of two continuous variables. Multiple linear regression analysis was performed to measure the amount of influence a predictor variable had on a dependent variable. Results were significant when the observed significance level was $p < 0.05$.

### Ethical and legal approval

This study was approved by the Medical Research Ethics Committee of the University of Alborz (Reference No: Abzums. Rec.1395.114). Informed consents were obtained from Parents and participants as appropriate, before the commencement of the study. The subjects

were given an information sheet (Patients Information Sheet (PIS)) with detailed explanation of the aims and method of the study. An opportunity for further discussion prior to the enrolment as well as an option to withdraw from the study at any time was given to the participants.

## Results

### Socio-demographic characteristics of subjects

A total of 280 adolescents (140 males and 140 females) with the mean age of 14.33 ± 1.80 years participated in this study (Table 1).

| Characteristics | Respondents | |
|---|---|---|
| | n (%) | Mean ± S.D |
| **Education Level** | | |
| Secondary School | 140 (50) | |
| High School | 140 (50) | |
| **Gender** | | |
| Male | 140 (50) | |
| Female | 140 (50) | |
| **Overall Mean Age Group (Years)** | | 14.1 ± 1.5 |
| Age group: 12.0-13.0 | 110 (39.3) | 13.2 ± 1.2 |
| Age group: >13 | 170 (60.7) | 16.1 ± 0.9 |
| **Maternal Educational Level** | | |
| High school | 19 (6.8) | |
| Diploma | 40 (14.3) | |
| Bachelor | 76 (27.1) | |
| Master | 110 (39.3) | |
| PHD | 35 (12.5) | |
| **Paternal Educational Level** | | |
| High school | 10 (3.6) | |
| Diploma | 4 (1.4) | |
| Bachelor | 33 (11.8) | |
| Master | 77 (27.5) | |
| PhD | 156 (55.7) | |
| **Maternal Occupation** | | |
| Housewife | 118 (42.1) | |
| Employed | 20 (7.1) | |
| Student | 142 (50.7) | |
| **Paternal Occupation** | | |
| Student | 173 (61.8) | |

| | | |
|---|---|---|
| Employed | 107 (38.2) | |
| **Mean number of siblings** | | 1.8 ± 0.5 |
| With no sibling | 72 (25.7) | |
| With one sibling | 198 (70.7) | |
| With ≥ 2 siblings | 10 (3.6) | |
| **Living arrangement** | | |
| Alone | 8 (2.9) | |
| With Family | 272 (97.1) | |
| **Mean duration of time in Malaysia (Months)** | | 20.5 ± 6.2 |
| < 12 months | 80 (25.6) | |
| 13 - 24 months | 120 (42.9) | |
| 25 - 36 months | 68 (24.3) | |
| > 37 months | 12 (4.3) | |
| **Mean pocket money per week (RM: Local currency)** | | 26.7 ± 10 |
| 10 - 20 | 122 (43.6) | |
| 21 - 30 | 31 (11.1) | |
| 31 - 40 | 94 (33.6) | |
| 41 - 50 | 33 (11.8) | |
| **Mean monthly household income (RM: Local currency)** | | 2570 ± 494 |
| 1001 - 1500 | 8 (2.9) | |
| 1501 - 2000 | 23 (8.2) | |
| 2001 - 2500 | 130 (46.4) | |
| 2501 - 3000 | 61 (21.4) | |
| > 3001 | 58 (20.7) | |
| **Academic performance (Marks)** | | 17.8 ± 2.1 |
| 0 - 5 | 0 (0) | |
| 6 - 10 | 0 (0) | |
| 11 - 15 | 147 (52.5) | |
| 16 - 20 | 133 (47.5) | |

***Table 1:*** *Socio-demographic characteristics (n = 280).*

## Anthropometry

The mean weight, height and BMI-for-age of the respondents were 45.2 ± 8.7 kg, 156.3 ± 8.6 cm and 22.2 ± 5.9 kg/m$^2$, respectively. The mean BMI for females (22.8 ± 2.3 kg/m$^2$) was higher than that of males (21.2 ± 3.8 Kg/m$^2$), however this difference did not reach statistical significance. Respondents' BMI was compared to WHO BMI-for-age reference (WHO, 2007) and categorized into five categories. Over half (53.9%) of the respondents had normal weight, while 20% were overweight and 13.9% were obese. Interestingly, a marked proportion of study subjects had BMI lower than the normal levels. Of 280 participants, 48 (17.1%) were categorised as having severe thinness

while 40 (14.3%) were categorised as thin (Table 2). There was no significant difference in BMI between male and female study subjects (students), nor there were differences in proportion of subjects being as thin or severe thin in both groups (Table 2).

| BMI status | Male n (%) | Female n (%) | Total |
|---|---|---|---|
| Severe thinness | 25 (17.9) | 23 (16.4) | 48 (17.1) |
| Thinness | 19 (13.6) | 21 (15.0) | 40 (14.3) |
| Normal | 50 (35.7) | 47 (33.6) | 97 (53.9) |
| Overweight | 26 (18.6) | 30 (21.4) | 56 (20.0) |
| Obese | 20 (14.3) | 19 (13.6) | 39 (13.9) |
| Total | 140 (100) | 140 (100) | 280 (100) |

***Table 2:*** *Distribution of adolescents according to gender and BMI status (n = 280).*
**Significant P < 0.05.*

### Physical activity levels

Only 10% of the male and 17.8% of female study subjects reported daily physical activities during the previous week (swimming and playing football for male and dancing for female participants, respectively). The remaining 90% of male and 82.2% of female study subjects did not do any form of physical activities during the previous week.

There was a slight increase in proportion of participants engaging in some forms of physical activities during the weekend. At the weekend 14.5% of the male and 22.8% of female respondents participated in some form of physical activity and the remaining 85.5% of the male and 77.2% of the female study subjects reported no physical activity during the previous weekend.

### Dietary intake

### Meal pattern

Majority of participants (59.9%) took breakfast at fixed times while just over 40.1% had irregular meal pattern for breakfast. Almost half of the participants (46.5%) had breakfast alone while 53.5% of them had breakfast with their families or friends. Interestingly a vast majority of the females (44.5%) did not eat breakfast whilst only 6.0% of males tend not to have breakfast.

### Most frequently preferred foods

There was an equal split between consuming traditional Iranian foods like Chicken kebab, rice with lamb, rice with chicken, rice with lamb and vegetables and fish and while fast foods outlets such as KFC, MacDonald's, Burger King and Pizza Hut (45.9% and 43.7%, respectively). Only 2.7% of total participants chose Malaysian foods such as noodles, Nasi goreng (fried rice), Roti (local bread) and Nasi ayam (chicken rice) and the remaining 7.7% of respondents claimed that they did not have a preference in their choice of foods.

### Food frequency score

The food frequency (FFQ) scores were divided arbitrarily into three food frequency categories: 'highly consumed foods' (score = 80.0 - 100.0), 'moderately consumed foods' (score = 60.0 - 79.9), 'less consumed foods' (score = 59.9 and below). Cooked rice, cooking oil, white breads, chips, tea, meat, and sandwiches were in the 'highly consumed food category' underlining their significance as the major caloric source for participants in this study. Almost 92% of respondents consumed rice daily. The dietary preference in a typical Iranian meal consists of cooked rice and chicken or meat. After rice, cooking oil (FFQ score= 89.20) and white breads (FFQ score = 88.17) were the most

frequently consumed foods by the participants in this study. Soft drinks (mostly Coca-Cola), cucumber, potatoes, green leafy vegetables, cookies, cakes, eggs, cooked potatoes, ice cream, tomato, lettuce, apple, sugar, fast food, coffee were in the 'moderately consumed foods' while chicken, fish, some dairy foods including cheese, yogurt and milk as well as fruits and some vegetables, pizza and pasta, cooked corn, chocolate and milk chocolate were categorized as the less frequently consumed foods (Table 3).

| Food | Score | Food | Score |
|---|---|---|---|
| **Highly consumed foods (Score: 80.0 - 100.0)** | | | |
| Cooking oil | 92.8 | Tea | 81.7 |
| Cooked Rice | 89.2 | Meat | 81.0 |
| White bread | 88.1 | Sandwich | 80.0 |
| Chips | 87.4 | | |
| **Moderately consumed foods (Score: 60.0 - 79.9)** | | | |
| Cookie | 65.8 | Tomato | 61.6 |
| Cake | 65.6 | Lettuce | 61.5 |
| Egg | 64.3 | Apple | 61.5 |
| Cooked potato | 63.4 | Sugar | 61.0 |
| Ice cream | 62.5 | Fast food | 60.1 |
| Cookie | 65.8 | Coffee | 60.1 |
| Cake | 65.6 | Tomato | 61.6 |
| **Less consumed foods (Score: 0 - 59.9)** | | | |
| Cooked corn | 57.3 | Carrot | 38.2 |
| Chocolate | 55.5 | Lentil | 38.1 |
| Chocolate milk | 55.5 | Mango | 37.6 |
| Nut | 55.0 | Green Pepper | 37.3 |
| Honey | 53.6 | Lemon | 36.4 |
| Jam | 52.6 | Tangerine | 36.3 |
| Orange | 52.6 | Mangos teen | 36.2 |
| Orange juice | 52.4 | Yogurt | 34.4 |
| Chicken | 52.0 | Full Cream Milk | 33.3 |
| Tomato sauce | 51.9 | Gourd | 32.6 |
| Pizza | 51.2 | Watermelon | 32.0 |
| Cheese | 48.6 | Low fat Milk | 31.4 |
| Iranian bread | 47.5 | Plum | 30.9 |
| Fish | 46.3 | Chickpea | 30.4 |
| Red bean | 45.1 | Pear | 28.9 |
| Banana | 43.5 | Butter | 27.0 |
| Pasta | 40.8 | Dried fruits | 24.1 |
| Rambo tan | 40.4 | Grape | 23.2 |
| Egg plant | 40.4 | Pineapple | 22.3 |
| Spinach | 39.9 | Soya | 18.4 |
| Whole grain bread | 39.2 | Beet | 15.6 |
| Green bean | 38.3 | | |

***Table 3:*** *Food frequency score.*

## Factors associated with body weight status

### Socio demographic characteristics and Body weight status

There were no significant associations between study subject's BMI and maternal or paternal occupation and education, number of siblings or the duration of time being in Malaysia. However, there were significant associations between study subjects' BMI and study subjects' age, and availability of disposable cash to them ($p < 0.05$, for both) (Table 4).

| Variable tested | Statistical test used | P value |
|---|---|---|
| Maternal educational level | Chi square: $X^2 = 2.47$ | 0.45 |
| Maternal occupation | Chi square: $X^2 = 10.374$ | 0.73 |
| Paternal educational level | Chi square: $X^2 = 4.07$ | 0.35 |
| Paternal occupation | Chi square: $X^2 = 12.44$ | 0.68 |
| Number of siblings | Pearson Correlation: r = 0.04 | 0.29 |
| Duration of time as expat | Pearson correlation: r = 0.04 | 0.27 |
| Household income | Chi square: $X^2 = 14.55$ | 0.20 |
| Availability of disposable cash to pupils | Chi square: $X^2 = 5.976$ | 0.04 |
| Participant's Age | Pearson Correlation: r = 0.23 | 0.02 |
| Participant's Academic performance | Chi square: $X^2 = 12.2$ | 0.81 |
| Participant's Physical activity level | Pearson Correlation: r = 0.09 | 0.21 |

***Table 4:*** *Factors associated with higher BMI in Iranian expat school children living in Malaysia.*

### Dietary intakes and body weight status

In this study there was a direct correlation between dietary micronutrient intake (protein, vitamin A, C, $B_1$, $B_2$, niacin) and BMI. Overweight and obese subjects had significantly higher intake of protein, vitamin A, C, $B_1$, $B_2$, and niacin (Table 5).

| Variable | r | p-value |
|---|---|---|
| Protein (g) | 0.11 | 0.04 |
| Vitamin A (µg RE) | 0.16 | 0.001 |
| Vitamin C (mg) | 0.21 | 0.000 |
| Vitamin B1(mg) | 0.12 | 0.0001 |
| Vitamin B2 (mg) | 0.20 | 0.0001 |
| Niacin (mg NE) | 0.10 | 0.047 |
| Calcium (mg) | 0.16 | 0.02 |
| Iron (mg) | 0.15 | 0.04 |

***Table 5:*** *Correlation between body weight status and dietary micronutrient intake.*

Interestingly, multiple regression analysis showed the age and physical activities were the two most significant predictor variables associated with higher BMI (Table 6).

| Variables | Unstandardized Coefficients | Standardized Coefficients | |
|---|---|---|---|
| | Beta | Beta | p-value |
| Constant | 19.012 | | 0.000 |
| Age | 0.43 | 0.21 | <0.0001 |
| Physical activity score | -0.54 | -0.12 | 0.002 |

***Table 6:*** *Multiple linear regression of body weight status.*
*Notes: R = 0.289; $R^2$ = 0.083; F = 10.84, p < 0.01.*

## Discussion and Conclusion

Obesity has become a major health problem world-wide. Despite its preventable nature, it is not only has become a major issue in adults, but it is also profoundly affecting young adults (adolescence) and children globally [13]. Childhood obesity has been on the rise with estimated 158 million obese children in 2020, increasing to 206 million by 2025, and 254 million by 2030 [14] indicating a significant problem in not a distant future. Obesity is a major risk factor to an array of major chronic diseases which includes type 2 diabetes, cardiovascular diseases, depression, and several forms of life-threatening cancers, leading to premature morbidity and mortality [15]. Furthermore, the financial burden of obesity is as high as 20% of national healthcare expenditure in most industrialised countries. In the USA, UK and Germany, the annual healthcare costs attributable to obesity is estimated to top US$190, £5.1 and €30, billion per year, respectively [16-18], all of which underlines the importance of tackling obesity at a global level.

There are several reports outlining presence of an association between physical activity and BMI in children and adults. The association between physical activity levels and BMI appears to be a bidirectional interrelationship such that a reduced physical activity leads to a higher BMI [19-23], and a higher BMI in turn results in a greater reduction of physical activity levels with increasing sedentary lifestyle [24-26]**.** A remarkably low physical activity seen in this study indicates a markedly higher sedentary lifestyle and thus presence of a potential relationship between BMI and physical activity. In agreement with previous reports a multiple linear regression analysis of this study showed that physical activities were a significant predictor of a higher BMI. However, there are contrasting reports suggesting that body weight status and physical activity may not be inversely related in adolescents [27]. In adolescents, time spent in physical inactivity (sedentary status) appears to be a better indicator of obesity than the time spend in physical activity [28]. In this study the only other predictive parameter of BMI was the age of the study participants. This agrees with previous finding reporting a steady reduction in physical activities of preschool, school aged and adolescent children with increasing age [26,29-31]. An important finding in this study was a remarkable similarity between the proportion of subjects categorised as overweight and obese to those being as severe thin and thin. This was irrespective of the parental educational or socioeconomic status outlining existence of other factors causing states of severe thinness and thinness in these children. This study did not examine potential causes for low body weights, but it merits investigation to elucidate potential markers contributing to the states of severe thinness and thinness in expat school-aged Iranian children living in Malaysia.

In this study, PAQ-C questionnaire was considered as a suitable tool to evaluate participants' activities in a school environment. It covers physical activity of the individuals in school, after school, evenings, weekends and leisure time. The questionnaire has 10 items focusing to ascertain levels of physical activity for each participant. In our study, the internal consistency of this assessment method for an independent sample of 24 adolescents was found to be within acceptable levels (Cronbach's alpha = 0.75).

In the present study, there was a significant association between protein, vitamin A, C, B1, B2, niacin, calcium and iron with body weight status. This is an interesting finding as others have reported lower than recommended intake of micronutrients amongst adolescents in Malaysia [32] and overweight and obese Iranian children living in mainland Iran [33]. A higher parental educational status together with a

favourable socioeconomic status of expats compared with general population could explain improved micronutrient intake seen amongst expat Iranian children living in Malaysia compared with the local Malaysian population and the Iranian children living in mainland Iran. The overweight boys and girls often report lower energy and carbohydrate intake than their normal-weight counterparts [34]. Overweight boys derive a greater percentage of their energy from fat with a lower contribution from carbohydrate than their normal-weight counterparts. Similarly, girls drive a percentage of energy from fat with increasing BMI at the expense of fibre intake [35]. Therefore, these potentially modifiable factor could provide an opportunity to parents and adolescents to manage their body weight status.

In summary, increasing age and availability of disposable cash were the main factors associated with higher BMI and obesity in expat Iranian school age adolescents living in Malaysia. Interestingly, total family income was not a risk factor for obesity, nor were parental educational level suggesting little or no influence of parental educational status on their children's eating behaviour. These finding suggests that Iranian expats provide enough disposable cash to their off-springs regardless of the total family income- a habit that is a potentially contributing factor toward their off-springs' obesity. The lack of influence of parental education on off-springs' obesity could in turn be due to several factors including lack of parental time to provide practical and educational nutritional support to their off-springs. As the vast majority of parents were either in full-time working or studying, therefore potentially limiting the available time to prepare healthy food or discuss consumption of healthy food outside the home (nutritional educational discussions). A study by Michigan University reported only one-third of parents think they are doing a good job helping kids eat healthy foods [36], primarily due to lack of time and work-related stresses. Therefore, it appears that parental input for a healthy diet uptake plays a vital role in off-spring obesity prevention.

Although findings from this study could provide a baseline data for designing nutritional programs (practical and educational) for the prevention and control of obesity among the expat Iranian adolescents however it has limitations that merits further research to addressed and clarified. The time spent in a sedentary state, together with access to exercise regiments/facilities, and above all, extend of parental input in promoting healthy diet should be carefully assessed in future studies.

## Conflict of Interest

The authors have reported no conflict of interest.

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**Volume 5 Issue 10 October 2020**
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