

An Investigation of Fruits and Vegetables Intake Among Female Adolescents of the City of Isfahan

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Abstract

Background: A diet rich in fruits and vegetables can lower the risk of cancer, cardiovascular diseases and strokes. For adolescents, particularly females, eating enough fruits and vegetables is critical. This study intended to explore fruits and vegetables intake among the female adolescents living in the city of Isfahan, Iran.

Methods: This descriptive-analytical study was performed on 331 female students, who were recruited by cluster randomized sampling. A valid self-designed questionnaire was used that covered a set of items on demographic data and amount of fruits and vegetables used by the students. This questionnaire was completed by the students in their classrooms, during school hours.

Results: The average intake of fruits and vegetables by female adolescents was 3.11 servings per day. In this study, for 10.3% of the female adolescents, the intake of fruits and vegetables was 5 servings or more. For female adolescents, there was a statistically significant correlation between the consumption of fruits and vegetables and the level of education of their parents. It was also found that the intake of fruits and vegetables was positively correlated with the household's income.

Conclusions: Given the standard values reported for the intake of fruits and vegetables, the findings of this study revealed that the female adolescents participating in this research were susceptible to the health risks resulting from insufficient consumption of fruits and vegetables.

Keywords: Fruits Intake, Vegetables Intake, Female Adolescents

1. Background

A low fat diet, high in fruits and vegetables, has been recommended as a healthy diet with positive effects on health (1). Fruits and vegetables are lower in calories but high in vitamins, minerals and fibers (2). It is argued that fruits and vegetables can be regarded as a suitable replacement for high-fat foods, especially saturated fat, carbohydrate and sodium, so that the variety and quality of these foods can have positive health effects (3, 4). It has been reported that low consumption of fruits and vegetables may decrease cardiovascular diseases by up to 31%, brain strokes up to 19%, and gastrointestinal tract cancer up to 19% (5). Given the role of daily intake of vegetables and fruits in the promotion of the community's health, it is recommended for all individuals to include at least 400 gr or five servings of fruits and vegetables per day in their diets to prevent cardiovascular diseases and cancer (6). The literature reports different estimates for the amount of vegetables and fruits consumption ranging from 100 gr per day, in undeveloped nations, to about 450 gr in European nations (5). The amount of vegetable and fruit intake among the adolescents is lower than the recommended servings. According to the Disease control and prevention organiza-

tion's report, only 20.3% of female adolescents aged 9 to 12, eat 5 (or more) servings of fruits/vegetables, daily (7). As per the national health and nutrition examination survey (NHANES), the amount of fruit intake is 3 units per day for girls aged 12 to 19 years old (8). The main purpose of health-oriented interventions is to promote diet quality. Such interventions are also of particular importance for the adolescent age group. In order to execute these interventional plans in a better way, it is very important to recognize variables related to diet and identify factors related to change of behavior (9).

Numerous studies have been conducted on different factors affecting fruit/vegetable intake in terms of individual (gender, education (8, 10), cultural factors, financial status, and nutritional awareness) and situational levels (social support, accessibility, and availability) (11). There are also various researches, which have tried to explore the association between demographic variables, health-related factors, and fruits/vegetables consumption among individuals. As per the findings of these studies, aging individuals, females, individuals with higher income, and physically active individuals with normal Body Mass Index (BMI) tend to consume much more fruits/vegetables compared

to other groups (12, 13). According to the study findings of Jones, household income was not significantly related to fruits/vegetables consumption among children (14). Although there are numerous factors affecting the amount of fruits/vegetables consumed by adolescents, the majority of studies tried to explore household's life style to find its relation with fruits/vegetables consumption (15). The number of existing studies on exploring the association between demographic variables and fruits/vegetables consumption among adolescents are very limited, with most of them conducted on European nations. As a result, given the need for such analysis for Iranian adolescents, the authors decided to explore fruits/vegetables intake among female adolescents in the city of Isfahan and its association with the demographic variables.

2. Methods

This study was conducted using descriptive-analytical method on female students of high schools, recruited from 5 regions of Isfahan city, during the academic year 2013 to 2014. Among 350 questionnaires distributed among region number 5 students, only 331 were complete and analyzable. Sampling was conducted using the multi-stage cluster sampling method. In this method, from a total 5 regions of Isfahan city, 2 girls' high schools were selected randomly so that, in total 10 girls' high schools were selected proportional to the sample size. In the next step, from every high school and from every level of study (1, 2 and 3), only one class was chosen. This research was conducted by obtaining required permits from the University Research Council and written consent from the Education and Training authorities. Considering the curriculum of the selected samples and after making necessary arrangements with the management of the school, the researchers visited the high schools in person at different times to distribute the questionnaires among students. It is worth mentioning that at first, the researchers gave some information to the students, explaining the objectives of the study and assuring them of the confidentiality of the data. Those, who did not want to participate in the study or those, who delivered incomplete questionnaires, were excluded from the study.

Data were collected using anonymous self-administered questionnaires, covering both close and open items. Designing of the questionnaire was done by studying related textbooks and articles, and by expert recommendations. The questionnaire composed of two sections: the first section covered items on the age, region, class, field of study, parents' job and level of education, the size of the household, the household income, and the self-assessment of the economic status. The second section was

dedicated to items on the frequency of fruits/vegetables intake and their types. After collecting data and their rating, the obtained data were entered in SPSS 17 software to be analyzed using descriptive statistics and one way analysis of variance (ANOVA).

3. Results

The age range of the study participants was 14 to 18 years old (mean age of 15.61 ± 1.02). In Table 1, the demographic characteristics of the subjects have been summarized. The highest and lowest frequencies observed for fruit or fresh fruit juice was two servings daily (93 subjects, 28.2%) and one serving on the alternate-day (10 subjects, 3%), respectively. Overall, 1.5% of the female students (5 subjects) asserted that they never consumed fruit or fresh fruit juice (Table 2). In general, the mean intake of fruits among female students was 1.75 with a standard deviation of 1.46. As far as consuming vegetables was concerned, the highest and lowest frequency was found to be two servings per day (106 subjects, 32.3%) and five servings or more per day (8 subjects, 2.4%) while 9 subjects (2.7%) reported that they did not consume any kind of vegetable (Table 2). The mean consumption rate among female students was 1.36 with a standard deviation of 1.16. Regarding the association between the fruits/vegetables consumption and year of education at high school, it was found that eating vegetables was significantly higher among students in the second year compared to other years ($P = 0.04$). Regarding the relationship between fruits/vegetables intake and level of study of the parents, the results of one way ANOVA showed that fruits/vegetables intake was higher for girls whose father ($P = 0.492$) and mother ($P = 0.012$) had higher levels of education. Regarding the association between fruits/vegetables consumption and household income, higher fruit intake was observed for households of higher income ($P = 0.005$) (Table 3). However, there was no statistically significant association between age ($P = 0.266$), city regions ($P = 0.344$), and the job of the parent ($P = 0.433$), and fruits and vegetables consumption among female students.

4. Discussion

Given the fact that using fruits/vegetables is positively related with lower health risks such as cardiovascular diseases and cancer (16), the importance of consuming these group of foods should not be ignored (17, 18). Consuming sufficient fruits and vegetables plays an effective role in the absorption of minerals required for building healthy bones (19). Burning, in his study reported that female students aged between 14.1 and 19.8 years old, indicated a

mean intake of 3.6 servings of fruits/vegetables each day with 23.1% of them consuming over 5 servings of daily fruits/vegetables (20).

Despite the high nutritional value of fruits/vegetables, the majority of the students participating in this study tended to use fruits/vegetables less than 3 servings each day. In Dietz's study, more than half of the participants had less than 5 servings of fruits/vegetables in their daily diets. In this study, it was argued that this inappropriate diet may be continued until their adulthood (21). Insufficient or low consumption of fruits/vegetables may influence body mass index (BMI) directly or indirectly (22), reflecting the significance of fruits/vegetables intake for weight management purposes (21).

One of the factors related to fruits/vegetables intake, investigated in this study, was the direct relationship observed between the level of study of the parents and the amount of fruits/vegetables consumption. Similar to the present study, Riediger in his study revealed that there was a direct relationship between level of parents' education and fruits/vegetables consumption. In this study, it is argued that such positive effect may have resulted from nutrition trainings received by the parents or the parents' higher awareness regarding health risks and chronic diseases (23). Individuals of higher levels of education commonly have higher income. As a result, level of education is positively related to nutrition awareness and the amount of fruits/vegetables intake for the prevention of diseases (24).

In the present study, it was found that household income is directly associated with consumption of fruits/vegetables for Chinese and American adolescents, and Irish and African American adults (25). As per the findings of one study conducted in Netherlands, one of the major factors contributing to the low fruits/vegetables intake is the high cost of fruits/vegetables (26). Furthermore, surveys by the world health organization (WHO) during years 2002 and 2003 revealed that more than $\frac{3}{4}$ of the males and females in 52 nations with low and medium income levels consume 5 servings of fruits and vegetables in their daily diets, which is lower than minimum recommended values (27). As opposed to these findings, no statistically significant association was reported between the cost of fruits/vegetables and the socio-economic status, and the fruits/vegetables intake in Pearson's study (28). There are some limitations. Assessments were self-reported, and fruit intake was measured retrospectively.

As per the findings of this study, only a limited number of students tended to consume daily recommended values of fruits/vegetables. Furthermore, this study reported that there were several demographic variables including the parents' level of education and household income, which

were directly related to fruits/vegetables consumption reflecting the effect of the role of parents on adolescents' diet. Accordingly, increased awareness of parents and their involvement in the improvement process of eating habits of adolescents and supplying a healthy nutrition condition can be the goal of nutritional interventions to promote fruits/vegetables consumption among adolescents. To increase the amount of fruits/vegetables consumed by the students and promote healthy eating habits among them, this study recommends the intervention of school management with the cooperation of parents. Having a healthy, complete, and variant diet containing different types of fruits/vegetables can positively affect the longevity of individuals.

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Table 1. Distribution of Absolute and Relative Frequencies for Demographic Variables of Female Adolescents

Variable Name	Variable Label	Female Adolescents	
		Number	Percentage
Age, y	14	47	14.2
	15	114	34.4
	16	96	29
	17	98	20.5
	18	6	1.8
	1	73	22.1
Region	2	68	20.5
	3	64	19.3
	4	57	17.2
	5	69	20.8
	First year	149	45
Year of education in high school	Second year	87	26.3
	Third year	95	28.7
	Illiterate	4	1.2
	Elementary level	37	11.2
	Secondary level	70	21.1
Father's level of education	Diploma degree	129	39
	Associate of arts and bachelor of arts	74	22.4
	M.A. and Ph.D	13	3.9
	Illiterate	5	1.5
	Elementary level	47	14.2
	Secondary level	56	16.9
Mother's level of Education	Diploma degree	156	47.1
	Associate of arts and bachelor of Arts	65	19.6
	M.A. and Ph.D	1	0.3
	Worker	29	8.8
	Clerk	119	36
	Unemployed	5	1.5
Father's Job	Self-employed	45	14.9
	Teacher	2.7	9
	Retired	13	3.9
	Housekeeper	83.7	27.7
	Clerk	40	12.1
	Others	12	3.6
Mother's Job	3,000,000 or less	49	14.8
	3,000,000 to 60,000,000	118	35.6
	6,000,000 - 10,000,000	92	27.8
	More than 10,000,000	14.2	4.7

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Table 2. Distribution of the Daily Intake of Fruits/Fresh Fruit Juice and Vegetables in Female Adolescents^a

Variables	The Frequency of Daily Intake							
	5 servings or more	3 or 4 servings	2 servings	1 serving	One other day	2 or 3 servings per week	Sometimes	Never
Intake of fruits/fresh fruit juice	26 (7.9)	73 (22.1)	93 (28.2)	40 (12.1)	10 (3)	12 (3.6)	71 (21.5)	5 (1.5)
Intake of the vegetables	8 (2.4)	41 (12.5)	106 (32.2)	70 (21.3)	15 (4.6)	19 (5.8)	61 (18.5)	9 (2.7)

^aValue are expressed as N.(%).**Table 3.** Mean Scores Comparison of Demographic Variables and Fruits/Vegetables Consumption Among Female Adolescents

Variable Name	Variable Label	Fruits/Vegetables Consumption		P Value
		Mean	SD	
Father's level of education	Illiterate	1	2	0.49
	Elementary level	3.08	1.9	
	Secondary level	2.77	2.04	
	Diploma degree	3.08	1.91	
	Associate of arts and bachelor of arts	3.58	2.37	
	M.A. and Ph.D	3.84	2.91	
Mother's level of education	Illiterate	1.2	1.78	0.012
	Elementary level	2.77	1.91	
	Secondary level	2.65	1.96	
	Diploma degree	3.20	1.95	
	Associate of arts and bachelor of arts	3.76	2.54	
	M.A. and Ph.D	3	0	
Household income, Rial	3,000,000 or less	2.14	2.14	0.005
	3,000,000 - 60,000,000	3.27	1.03	
	6,000,000 - 10,000,000	3.37	2.04	
	More than 10,000,000	3.26	2.14	

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