Edible Oils Consumption and the Fatty Acids Profile of the Most Common Consumed Brands in Shiraz, Iran

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Abstract

Aim: This study aimed to measure edible oils consumption, the most preferred brands and their fatty acid profile compared with standard values in Shiraz, Iran.

Methods: In this cross-sectional study 384 households were assessed. Edible oil types (frying, sunflower, corn, canola, rapeseed, mixed, solid, olive, grapeseed, sesame, and animal), brands, volume of consumed, attention to the label, and changes in the volume of oil consumption compared to the last year were measured. Resistance, fatty acid patterns, total trans fatty acid, smoke point, and saturated fatty acids of the three most frequently consumed edible oils were compared to the standard recommended values.

Findings: The mean of households□ oil consumption was 40.34 ± 32.88 kg per year. Frying (78.6%), sunflower (60.70%), and olive (37.5%) oils were the most common consumed oil. 57.6% of participants read the labels. 28.9% could not understand the labels information. Compare to the last year, 53.8%, 46.8%, and 55.5% of studied households reported decrease in the liquid, solid and frying oils consumption. Fatty acid profile in majority of studied brands were in the standard range. Myristic acid level in the three major brands of solid oil was out of the standard range. The level of C16:1, C18:1, C18:2, C18:3 in the third common olive oil, C14:0 and saturated fatty acid in the third common frying oil were out of the standard range. The resistance level in the third common corn oil, the first common and the third common frying oil was out of the standard range.

Conclusion: Liquid, solid and frying oils consumption among studied population decrease than the last year, which can be helpful to reduce the risk of chronic diseases. The fatty acids profiles of the most common consumed brands were in the standard range.

Key words: *Edible oils consumption; Fatty acid profile; Saturated fatty acids*

Introduction

Noncommunicable diseases are one of the main public health challenges in the 21st century. Globally, these diseases are the leading cause of death with unacceptably high burden[(1)]. In 2016, 71% of the world's deaths were related to noncommunicable diseases. 78% of all noncommunicable diseases deaths occurred in low- and middle- income countries[(2)]. Cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes are the major noncommunicable diseases responsible for these deaths[(3)]. Global Noncommunicable Diseases Action Plan focused on reducing risk factors prevalence as the main effort to prevent and control these diseases[(4)].

Unhealthy diet is among risk factors for noncommunicable diseases. It is known that the dietary factors have an important role in the development and prevention of these diseases[(1)]. Obesity, as one of the main risk factors for many noncommunicable diseases,

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is directly related to unhealthy diet and less physical activity[5]. Dietary habits with high trans fats, saturated fats, sugar and salt are associated with increased risk of cardiovascular diseases, diabetes, and hypertension[6]. Also, it is shown that the risk of cardiovascular disease and diabetes are influenced by oils fatty acid profile. The risk of cardiovascular events increased following dietary content of high saturated fatty acids. And the higher risk of both cardiovascular disease and diabetes was associated with high intake of trans fat[7-8]. So, fatty acid reduction policies were considered. The World Health Organization, in 1994, recommended that less than 4% of the total fat as trans should be found in oil consumed[9].

Edible oil intake, as one of the important sources of fatty acids, plays key roles in human health. Edible oils are used by consumers in the preparation of everyday meals[10]. The type of oil consumed can be relate to risk factors associated with noncommunicable diseases. In the human body, low-density lipoprotein can be raised following excessive consumption of saturated fats and cholesterol[11-12]. Some oils with possible high levels of fatty acids like erucic acid or trans isomers of linolenic acid can be harmful for human health[13]. In the other hand some fatty acids that cannot be synthesized by human body are essential and need to be solely supplied through the diet[14]. Some oils that are unsaturated or contain omega-3 fatty acids or gamma linoleic acid are healthful[15-16]. So, it is important to examine the composition of edible oils in dietary intake across the world.

Iran as a developing country with a population more the 80 million fasces with burden of noncommunicable diseases. The changing dietary patterns is one of attributed factors to the rise in disease burden in Iran as the same as in the world[17]. The commonly used variety of cooking oils in Iran are solid and liquid oils, vegetable oils and animal oils[18]. The per capita consumption of edible oils among Iranian population has been increased remarkably[19]. Evaluation of household's patterns of the consumption of oils and fats, and brand preference of consumers for edible oils can be useful for policy makers. Little data is available regarding the status of edible oils consumption in Iran. So, the present study was designed to evaluate oils consumption, the most preferred brands in a sample of Iran population. Also, the fatty acid profile and physicochemical characteristics of frequently consumed edible oils were assayed and compared with reference value recommended by the Iranian Standards Organization.

Materials and Methods

This cross-sectional study was carried out on different edible oils consumed by urban households in Shiraz, Iran between July to September 2019. Participants included 384 individuals who willing to participate in the study. Those of the participants who did not response half of the questions were excluded. The protocol of the study was approved by the Ethics Review Board of the Shiraz University of Medical Sciences.

The participants were selected using random cluster procedure. Five of eleven municipal zones (as clusters) were randomly selected. Individuals in each area were randomly selected from the malls and supermarkets consumers in a simple random manner based on the population ratio of that area. Selected consumers (preferably the mother of the household) invited to participate in a face-to-face interview by trained interviewer. A questionnaire included questions about sociodemographic characteristics and brand preferences and consumption pattern of edible oils was used for data collection. Sociodemographic data included age, family size, marital status, job, education, family income, and presence of chronic diseases in the family. Data about the participants' pattern of oil consumption included edible oil types (frying, sunflower, corn, canola, rapeseed, mixed, solid, olive, grapeseed, sesame, and animal), edible oil brand, volume of used edible oils during the last week, consumers' attention to the oil label, and changes in the volume of oil consumption compared to the last year (as decreased, no change, increased). Eleven brands reported by participants are coded in alphabetical order from A to K.

The three most frequently consumed edible oils, based on participants' responses, were selected to analyses the oils physicochemical profiles by comparison to reference standards. For each type, three frequently consumed brans were purchased and sampled in coded packages (as A, B and C). The coded samples were sent to a unique laboratory. Resistance to heat, fatty acid patterns, total trans fatty acid, smoke point, and saturated fatty acids of the oils were measured by standard methods.

High-performance liquid chromatography method[20] was used to measured fatty acids including Lauric acid (C12:0), Myristic acid (C14:0), Palmitic acid (C16:0), Palmitoleic (C16:1), Margaric acid (C17:0), Stearic acid (C18:0), Oleic acid (C18:1), Linoleic acid (C18:2), Linolenic acid (C18:3), Arachidonic acid (C20:0), Eicosenoic acid (C20:1), C20:2, Behenic acid (C22:0), Erucic acid (C22:1), C22:2, Lignoceric acid (C24:0), and Elaidic C18:1T. The Rancimat technique was used to measure the oils resistance[21]. Measured values were compared to the standard values recommended by the Iranian Standards Organization and reported in three categories including in standard range, not in standard range and not measured (if the measuring was not necessary).

All statistical analyses were done using SPSS software for Windows (SPSS, Inc., Chicago, IL, USA, version 24). Findings reported as mean ± SD, number (%) or median [IQR] as appropriate. Multivariate logistic regression analysis was used to assessed factors associated with the use of each consumption oils. Odd Ratio with 95% confidence interval (CI) are reported for each factor and the statistical significance of the relationship was inferred from the CI.

Findings

384 individuals participated in this study. The characteristics of the study participants are presented in table 1. The mean of age was 39.4 years and 90.1% were married. Most of the subjects (69.8%) were housekeeper and 45.6% were overweight or obese. Hypertension (19.8%), hyperlipidemia (16.1%), and type 2 diabetes (15.4%) were the most common comorbidities in the studied participants according to their self-reports.

The mean of households oil consumption was 40.34 ± 32.88 kg per year (110.5 grams per day). Of studied households, 66.4% (255 participants) reported that they reuse the consumed oil. 39.8% (153 participants) reported that they use the oil in low flame heat, 56.1% (198 participants) use the oil in moderate flame heat and 8.6% (33 participants) high use flame heat during oil consumption. 246 participants (64.5%) reported that they keep the oil inside the cabinet, 32.3% (124 participants) keep the oil outside the cabinet and 36% (14 participants) reported that they keep the oil inside the refrigerator. Table 2 and 3 presented the oil consumption and brand preference of the studied participants for different types of oils. Households consume more frying (78.6%), sunflower (60.70), and olive (37.5%) oils than the other oils. The annual consumption of oil among households who consume sunflower oil (24 kg), solid oil (20 kg), frying oil 18 kg) and corn oil (18 kg) was more than the other oils. For frying oil, B (41.1%), G (13.9%) and C (12.6%) were the most brand preference of the households. For sunflower oil, B (40.3%), C (23.2%) and A (11.2%); For solid oil, C (44.6%), J (10.9), and E (6.9%) were the most popular brand of the households (Table 2). Also, for olive oil, A (16.7%), Imported edible oils (16.0%), and Home-made oils (11.8%) were the most brand preference of the households (Table 3).

Multivariate logistic regression was used to find factors associated with the type of oil consumption in studied participants (Table 4). Factors significantly associated with the use of cooking oil were age (OR, 1.04), academic education (OR, 3.26), income between 30-50 million Rials (OR, 2.54) and stroke (OR, 3.88). Older participant's age was significantly associated with lower use of sunflower oil (OR, 0.96). Participants who had a diploma (OR, 0.37) or academic education (OR, 0.27), preferred lower solid oil than those who were under diploma. Higher number of family size (OR, 1.53) and the family presence of hypertension (OR, 2.71) were significantly associated with increasing use of frying oil. Older age (OR, 1.03), having diploma (OR, 2.01), academic education (OR, 2.65), and the family presence of hyperlipidemia (OR, 1.83) were significantly associated with increasing use of other oils.

Of the study participants, 57.6% (n=221) reported to read the labels on the oil container and 28.9% (n=111) reported that they could not understand the labels information. Of 331 participants who consumed liquid oil, 53.8% reported decrease in the oil consumption than the last year. Of 109 subjects who consumed solid oil, 46.8% reported decrease in the oil consumption, and 55.5% of 308 subjects who consumed frying oil reported decrease in the oil consumption than the last year.

Fatty acid patterns and resistance in the major brands of oils according to the Iranian national reference standard are presented in Table 5. Fatty acid patterns and resistance to heat in the three major brands of sunflower oil were in the standard range. Myristic acid level in the

three major brands of solid oil was out of the standard range. The level of C16:1, C18:1, C18:2, C18:3 in the third common olive oil (C) were out of the standard range. Fatty acids including C16:0, C18:0, C18:3, C20:0 in the second common corn oil (B) were out of the standard range. Fatty acids including C18:3 and C20:0 in the first common sesame oil (A) and C18:0, C18:2, C18:3, C20:0 in the third common sesame oil (C) were out of the standard range. C14:0 and saturated fatty acid in the third common frying oil (C) were out of the standard range. Also, the resistance level in the third common (C) corn oil, and the first common (A) and the third common (C) frying oil was out of the standard range.

Table 1: Characteristics of the study participants	
Age	39.4 ± 10.6†
Family size	3 [3-4] ††
Marital status	
Married	346 (90.1) *
Single	38 (9.9) *
Job	
Housekeeper	268 (69.8) *
Employed	82 (21.4) *
Self-employment	34 (8.9) *
Education	
Under diploma	100 (26.0) *
Diploma	115 (29.9) *
Academic	169 (44.0) *
Family income (Rials)	
<20 million	116 (30.2) *
20-30 million	129 (33.6) *
30-50 million	100 (26.0) *
>50 million	39 (10.2) *
Overweight or Obesity	175 (45.6) *
Heart disease	36 (9.4) *
Stroke	18 (4.7) *
Hypertension	76 (19.8) *
Hyperlipidemia	62 (16.1) *
type 2 diabetes	59 (15.4) *
Chronic kidney disease	19 (4.9) *
Data are expressed as † mean ± SD, †† median [IQR], *number (%)	

Table 2: Oil consumption and brand preference of the studied participants for major types of oils							
	Frying oil	**Sunflower oil**	**Corn oil**	**Canola oil**	**Rapeseed oil**	**Mixed oil**	**Solid oil**
Number (%)*	302 (78.6)	233 (60.7)	43 (11.2)	28 (7.3)	11 (2.9)	12 (3.1)	101 (26.3)
Annual use (kg)ŧ	18 [12-24]	24 [12-36]	18 [12-24]	12 [6-18]	12 [9-24]	15 [12-24]	20 [12-34]
Brand							
A*	34 (11.3)	26 (11.2)	5 (11.4)	8 (28.6)	1 (9.1)	-	1 (1.0)
B*	124 (41.1)	94 (40.3)	18 (40.9)	10 (35.7)	2 (18.2)	7 (58.3)	-
C*	38 (12.6)	54 (23.2)	3 (6.8)	3 (10.7)	1 (9.1)	3 (25)	45 (44.6)
D*	7 (2.3)	5 (2.1)	-	-	-	-	3 (3.0)
E*	5 (1.7)	5 (2.1)	-	-	-	-	7 (6.9)
F*	5 (1.7)	6 (2.6)	3 (6.8)	-	-	-	-
G*	42 (13.9)	11 (4.7)	1 (2.3)	-	3 (27.3)	-	-
H*	2 (0.6)	1 (0.4)	-	-	-	-	2 (2.0)
I*	4 (1.3)	1 (0.4)	-	-	-	-	2 (2.0)
J*	-	-	-	-	-	-	11 (10.9)
K*	-	-	-	-	-	-	5 (5.0)
Unknown*	41 (13.6)	29 (12.4)	13 (29.5)	6 (21.4)	4 (36.4)	2 (16.7)	24 (23.8)

Data are expressed as *number (%) or ŧ median [IQR]
11 consumed oil brands reported by participants for main oils were coded in alphabetical order from A to K

Table 3: Oil consumption and brand preference of the studied participants for other types of oils				
	Olive oil	**Grapeseed Oil**	**Sesame oil**	**Animal oil**
Number (%)	144 (37.5)	8 (2.1)	70 (18.2)	56 (14.6)
Annual use (kg)	4.6 [2.4-12]	2.2 [1.1-5.2]	6 [2.9-12]	7.7 [2-24]
Brand				
Imported edible oils	23 (16.0)	3 (37.5)	5 (7.1)	
Home-made oil	17 (11.8)	2 (25)	42 (60.0)	40 (71.4)
A	24 (16.7)	-	2 (2.9)	-
B	3 (2.1)	-	1 (1.4)	-
C	4 (2.8)	-	-	-
D	3 (2.1)	-	-	-
Industrial oil	-	-	-	16 (28.6)
Not knowing	70 (48.6)	3 (37.5)	20 (28.6)	

Data are expressed as number (%)
4 consumed oil brands of other types reported by participants were coded in alphabetical order from A to D

Table 4: Factor associated with the type of Oil consumption in the studied participants by multivariate logistic regression analysis

	Cooking oil	Sunflower oil	Solid oil	Frying oil	Other oil
Age (year)	1.04 (1.01 to 1.07)	0.96 (0.94 to 0.98)	1.001 (0.97 to 1.03)	0.99 (0.96 to 1.02)	1.03 (1.01 to 1.06)
Family size	1.05 (0.84 to 1.30)	0.95 (0.79 to 1.14)	1.22 (0.99 to 1.51)	1.53 (1.19 to 1.96)	0.98 (0.81 to 1.18)
Marital status, single (ref)					
Married	0.61 (0.25 to 1.53)	1.42 (0.63 to 3.19)	1.08 (0.40 to 2.87)	0.44 (0.15 to 1.31)	0.47 (0.19 to 1.11)
Education, under diploma (ref)					
Diploma	1.45 (0.69 to 3.04)	1.05 (0.59 to 1.87)	0.37 (0.19 to 0.69)	0.71 (0.34 to 1.49)	2.01 (1.11 to 3.65)
Academic	3.26 (1.43 to 7.45)	0.89 (0.45 to 1.74)	0.27 (0.13 to 0.59)	0.68 (0.29 to 1.57)	2.65 (1.33 to 5.29)
Job, housekeeper (ref)					
Employed	0.50 (0.24 to 1.03)	1.70 (0.89 to 3.23)	1.40 (0.64 to 3.06)	1.04 (0.50 to 2.18)	1.82 (0.95 to 3.49)
Self-employment	0.39 (0.12 to 1.24)	1.16 (0.53 to 2.58)	2.19 (0.95 to 5.08)	0.75 (0.31 to 1.82)	0.78 (0.36 to 1.72)
Family income, <2million (ref)					
2-3 million	0.91 (0.45 to 1.82)	1.11 (0.64 to 1.93)	1.63 (0.89 to 2.99)	1.18 (0.61 to 2.29)	1.23 (0.71 to 2.14)
3-5 million	2.26 (1.11 to 4.59)	0.71 (0.39 to 1.32)	0.68 (0.32 to 1.42)	1.15 (0.54 to 2.47)	1.11 (0.59 to 2.06)
>5 million	0.71 (0.25 to 2.04)	0.59 (0.26 to 1.37)	0.75 (0.26 to 2.20)	0.81 (0.31 to 2.14)	2.41 (0.95 to 6.09)
Overweight or obesity	1.001 (0.59 to 1.70)	1.24 (0.79 to 1.93)	0.93 (0.56 to 1.54)	1.18 (0.69 to 2.00)	1.06 (0.69 to 1.67)
Heart disease	0.89 (0.36 to 2.24)	0.96 (0.44 to 2.12)	0.73 (0.29 to 1.83)	0.31 (0.14 to 1.98)	1.09 (0.49 to 2.45)
Stroke	3.45 (1.45 to 10.27)	0.67 (0.23 to 1.90)	2.51 (0.78 to 8.06)	2.38 (0.45 to 12.68)	1.41 (0.45 to 4.45)
Hypertension	1.03 (0.52 to 2.02)	1.07 (0.60 to 1.92)	1.44 (0.75 to 2.78)	2.71 (1.17 to 6.29)	1.18 (0.65 to 2.15)
Hyperlipidemia	0.58 (0.27 to 1.28)	1.05 (0.56 to 1.98)	0.46 (0.20 to 1.05)	1.04 (0.47 to 2.31)	1.83 (1.09 to 3.79)
Diabetes	1.01 (0.47 to 2.16)	1.36 (0.71 to 2.60)	0.99 (0.47 to 2.10)	1.22 (0.54 to 2.79)	1.06 (0.54 to 2.07)
Chronic kidney disease	0.87 (0.25 to 3.09)	1.74 (0.57 to 5.28)	0.66 (0.19 to 2.28)	1.05 (0.27 to 4.04)	0.89 (0.34 to 2.52)

Data are expressed as Odd's Ratio (95% CI), Cooking oils including corn, canola, rapeseed and mixed oils; Other oils including olive, sesame, animal and grapeseed oil

Table 5: Fatty acid patterns and Resistance in the popular brands of oils according to the Iranian national reference standard

		C12:0	C14:0	C16:0	C16:1	C17:0	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C20:2	C22:0	C22:1	C22:2	C24:0	C18:1T	T.T	S.P	SFA	R
Sunflower	A	+	+	+	+		+	+	+	+	+	+		+	+		+					
	B	+	+	+	+		+	+	+	+	+	+		+	+		+					+
	C	+	+	+	+		+	+	+	+	+	+		+	+		+					+
Solid	A	+	×	+	+	+	+	+	+	+	+	+		+	+		+	+	+		+	+
	B	+	×	+	+	+	+	+	+	+	+	+		+	+		+	+	+		+	+
	C	+	×	+	+	+	+	+	×	+	+	+		+	+		+	+	+		×	+
Olive	A		+	+	+	+	+	+	+	+	+	+		+			+	+	+			+
	B		+	+	+	+	+	+	+	+	+	+		+			+	+	×			+
	C		+	+	×	+	+	×	×	×	+	+		+			+					+
Corn	A	+	+	+	+		+	+	+	+	+	+	+	+	+		+					+
	B	+	+	×	+		×	+	+	×	×	+	+	+	+		+					+
	C	+	+		+		+	+	+	+	+	+	+	+	+		+					×
Sesame	A	+	+	+	+	+	+	+	+	×	×	+	+	+	+	+	+	+	+			+
	B		+	+	+	+	+	+	+	+	+	+		+			+					+
	C		+	+	+	+	×	+	×	×	×	+		+			+					+
Canol	A		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+		+
	B		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+		+
Frying	A	+	+	+	+		+	+	+	+	+	+	+	+	+		+		+	+	+	×
	B	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+		+	+	+	+
	C	+	×	+	+		+	+	+	+	+	+	+	+	+		+		+	+	×	×

The three most frequently consumed edible oils for each type are coded in alphabetical order from A to C.
C12:0, Lauric acid; C14:0, Myristic acid; C16:0, Palmitic acid; C16:1, Palmitoleic; C17:0, Margaric acid; C18:0, Stearic acid; C18:1, Oleic acid; C18:2, Linoleic acid; C18:3, Linolenic acid; C20:0, Arachidonic acid; C20:1, Eicosenoic acid; C20:2, ; C22:0, Behenic acid; C22:1, Erucic acid; C22:2, ; C24:0, Lignoceric acid; C18:1T, Elaidic; T.T, Total trans; S.P, Smoke point; SFA, Saturated Fatty Acids; R, Resistance. × Not in range + In range Not measured

Discussion

In the present study the profile of edible oils in a sample of Iran population in Shiraz was assessed. Our findings show that the daily households' oil consumption was 110.5 grams. Frying (78.6%), sunflower (60.7%), and olive (37.5%) were the most frequent oils consume reported by our studied households. Age, income, family presence of chronic disease, education, and family size were among factors associated with the type of oil consumption. 57.6% participants read the oil container labels, 28.9% do not understand label information. The level of fatty acids and resistance to heat in the most frequent brands of different types of assessed oils were in the standard range.

We find that daily use of oil consumption in our study population was 110.5 grams. This finding is lower than that reported for other study. Salehzadeh et al. studied 460 households in Sanandaj city, Iran, and reported that the mean oil consumption per household was 149.2925 grams[22]. The difference between findings can be explain by different characteristics of studied population. Our study population were older and had higher education level than Salehzadeh et al. studied population. It is previously show that age and education are associated with edible-oil intake behavior[23]. Salehzadeh et al. identified that consumed amount of oil was associated with higher education levels, however, they found that the households with higher education used sesame and olive oils significantly more than those households with low education levels consumed amount of oil was higher education levels[22].

Frying oil was the most frequent consumed oils in our study. Frying oil which is the most common consumed oil in Iran is vegetable and animal oil that is used to fry food at high temperatures. In our study all fatty acid profile of most of common consumed frying oil are in the standard rang. The third common brand of frying oil which used by 12.6% of consumers contain myristic acid and SFA out of standard range. In a study by Abedi et al. [24], fatty acids of frequently consumed edible oils and fats marketed in Iran were assessed and they found that the highest and contents of SFA was seen in frying oils. Evidence show that myristic acid and SFA is associated with coronary heart disease. Where the replacement of

myristic acid and SFA were associated with reduction of coronary heart disease risk[25]. Sunflower oil was the second most frequent consumed oils in our study. Also, all fatty acid profile of the most of common consumed sunflower oil are in the standard rang. Similarly, other studies reported that sunflower is the most consumed oils for cooking in India and Turkey[26-27]. Compare with the other oils, refined sunflower oil is one of the healthiest and cheapest oils. This oil is suitable for frying due to good thermal stability and high smoke point. In addition, because of ability to keep viscosity and consistency at lower temperature it can good to making salad. In the other hand sunflower oil is containing high proportion of polyunsaturated fatty acids[28]. Linoleic is one of the acids that is high in this oil. It is shown that presence of linoleic has hypocholesterolemia effect and can reduce the risk of cardiovascular disease. Also, this oil contains vitamins and natural antioxidants[29]. Olive oil was the third most frequent consumed oils in our study. The fatty acid profile of the two most of common consumed olive oil were in the standard rang. Home-made olive oil which used by 11.8% of consumers contains palmitoleic, oleic, linoleic, linolenic acids and SFA out of standard range. Similarly, olive oil reported to be the second most consumed oil in Turkey[26]. Olive oil contains high amount of triolein which is beneficial for health and has aging retarding effect[29]. In addition, olive oil known to be effective in the prevention of cardiovascular, hypertension, cancer, digestive system and nervous system diseases[29-30].

Our results showed 57.6% of consumers read labels before making a purchase but 42.4% do not read the labels. Similarly, one study reported that 53.4% of the consumers read and 46.6% do not read the labels before purchasing[31]. Another study, show that 27% of consumers have never or rarely read food labels before purchasing[32].

This study has some strengths and limitations to highlight. Strengths were as follow; a comprehensive assessment of the various common brands of oils was done. Other than participants oil consumption assessment, their attention to labels and their literacy in this regard were also evaluated. Also, for better precision, all questionnaires were completed by face- to-face interview by the main investigator. Our limitations were as follow; first, data collected for this survey is self-reported households' consumption and used brands of edible oils in their daily diets. This can lead to an under/overestimation of consumption data and information regarding the used brands. Second, sample size may be not enough to generalize our results to all regions of Iran. Third, this study is limited to the one city, therefore because of the different cultural and economic characteristics, the results cannot be generalized to the other cities in Iran. So, multicenter studies with larger sample size must be down to more clarify households' consumption and used brands of edible oils.

Conclusion

In summary, the present study revealed that frying, sunflower, and olive oils were the most frequent oils consume reported by studied households. We found that oils consumption among studied population decrease compare than the last year, these can be helpful to reduce the risk of chronic diseases as one of the main causes of overweight or obesity. The level of fatty acids and resistance heat in the most frequent brands of different types of assessed oils were in the standard range. These finding show that Iran policies targeting to control the fatty profile of the most of the edible oils were effectiveness, although, monitoring and updating information on the fatty profile of edible oils based on new evidence should be considered by policy makers. In addition, our other finding identifies that 42.4% of studied households do not read the oil container labels before making a purchase. These finding shows the need for learning programs to increase the households' knowledge and awareness about the appropriate use of edible oil container labels.

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