



Journal of Nutrition and Food Security

Shahid Sadoughi University of Medical Sciences
School of Public Health
Department of Nutrition
Nutrition & Food Security Research Center



eISSN: 2476-7425

pISSN: 2476-7417

JNFS 2017; 2(4): 279-287

Website: jnfs.ssu.ac.ir

People's knowledge, Attitude, and Self-efficacy towards Preventive Nutritional Behaviors of Cardiovascular Diseases

Samera Radmerikhi; MSc¹, Vahid Ahmadi Tabatabaei; MD; PhD², Yunes Jahani; PhD³,
Afsaneh Rajizadeh; MSc⁴ & Mohabbat Mohseni; PhD⁵

¹ Department of Health Education, Kerman University of Medical Sciences, Kerman, Iran.

² Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.

³ Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.

⁴ Health Services Management Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.

⁵ Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.

ARTICLE INFO

ORIGINAL ARTICLE

Article history:

Received: 9 Jan 2017

Revised: 20 Mar 2017

Accepted: 4 May 2017

*Corresponding author:

mohabbat.mohseni@gmail.com
Assistant Professor in Public
Health and Health Promotion,
Social Determinants of
Health Research Center,
Institute for Futures Studies
in Health, Kerman University
of Medical Sciences,
Kerman, Iran.

Postal code: 7616911320

Tel: +98 09131408140

ABSTRACT

Background: Cardiovascular diseases (CVD) are one of the major causes of mortality in the world. Incidence of such diseases has a direct relationship with lifestyle and nutrition. So, this study was conducted to investigate and compare knowledge, attitude, and self-efficacy of Kerman residents towards eating behaviors preventing CVD. **Methods:** In this descriptive-analytic cross-sectional study, 400 men and women aged 20 to 60 years were randomly selected. A 31-item questionnaire on knowledge, attitude, and self-efficacy regarding eating behaviors affecting CVD was used to collect the data. A panel of experts confirmed validity of the questionnaire. The questionnaire's internal reliability was confirmed through Cronbach's alpha coefficient (0.84) and test-retest method (0.71). **Results:** The study population included 202 women (54.9%) and 166 men (45.1%). The overall average scores of perceived knowledge, attitude, and self-efficacy out of 100, were respectively 84.15 ± 10.7 , 47.84 ± 7.67 , and 59.1 ± 16.57 . In all three cases there was a significant difference between men and women ($P < 0.05$). Men with higher university education had a better attitude and knowledge about health condition; this was effective on men's self-efficacy. Being a full-time employee also increased women's self-efficacy. **Conclusion:** Although knowledge of the studied population was appropriate and their self-efficacy was in the middle level, the participants' attitude was poor. Self-efficacy of women was significantly higher than men and proper eating behavior was affected by attitudes, skills, and environmental factors.

Keywords: Knowledge; Attitude; Self-efficacy; Eating behaviors; Cardiovascular diseases

Introduction

Cardiovascular diseases (CVDs) include a wide range of diseases in which blood supply to the

heart muscle is impaired (WHO, 2014). Despite great advances in medical science CVDs is still one of the main causes of disease burden in Iran

This paper should be cited as: Rad Merikhi S, Ahmadi Tabatabaei V, Jahani Y, Rajizadeh A, Mohseni M. *People's knowledge, Attitude, and Self-efficacy towards Preventive Nutritional Behaviors of Cardiovascular Disease. Journal of Nutrition and Food Security (JNFS)*, 2017; 2 (4): 279-287.

and the world (Lloyd-Jones *et al.*, 2009, Sadeghi *et al.*, 2015). In 2012 about 46% of worldwide deaths were caused by CVDs (WHO, 2015), it also is estimated that by 2020 this rate will be the world's main cause of mortality (Maracy *et al.*, 2015). In Iran, deaths from CVDs from 31.9% in 1990 reached to 46.8% in 2010 (Asl *et al.*, 2015). In addition, the incidence of myocardial infarctions in Iranian men was estimated twice than women (Ahmadi *et al.*, 2015). The risk of CVDs causes additional costs to communities and families and increases the number of days lost (Hayek *et al.*, 2016, Talebizadeh *et al.*, 2009, Uthman, 2016).

Despite the growing number of CVDs, these diseases are preventable to about 80% (Tabatabaei-Malazy *et al.*, 2014). Although many factors are involved in the etiology of CVDs (Rezazadeh *et al.*, 2010), lifestyle changes such as smoking cessation, proper diet, weight loss, lower blood pressure, physical activity, and stress reduction are the most effective strategies to prevent or delay the incidence of these diseases (Alwaili *et al.*, 2009). Moreover, the impact of lifestyle was found to be more important than genetics (Alwaili *et al.*, 2009). Among the factors listed, nutrition has a greater role in this regard due to a direct impact on metabolism (Haghdoust and Mirzazadeh, 2006). One of the main reasons for the low prevalence of CVDs in Mediterranean countries is attributed to their diet (Mediterranean diet) (Bjørklund and Chirumbolo, 2017). Although the role of some foods in the prevention of CVDs is still in doubt, various studies have shown that unsaturated oils such as olive oil, fish oil, as well as consumption of fruits and vegetables (due to high fiber and antioxidants) have a protective effect against heart disease. Reduction of red meat consumption due to having saturated fat and salt is also recommended to prevent CVDs (Mohammadifard *et al.*, 2016). Diet is important and is considered as one of the main lines of treatment for hypertension and hyperlipidemia. Diet-related complications of CVDs can be delayed by an appropriate diet (Bai *et al.*, 2016). According to figures obtained in Iran along with the change in diet patterns and trends in the Western diet, the incidence of diseases such as

hypertension and hyperlipidemia also increased (Ghaffari *et al.*, 2013, Kim and Kim, 2015). Among the risk factors associated with CVDs, nutrition is an effective and reversible factor that has always been taken into account in planning for the prevention of CVDs.

Studies have shown that nutritional performance and diet is largely related to the knowledge (Rezazadeh *et al.*, 2010). According to the results, low nutritional knowledge had a significant relationship with a high intake of salt and sugar, so even small efforts to improve the diet can improve inflammatory indicators in patients with CVD (Sjögren *et al.*, 2010). Therefore, assessment of nutritional knowledge and attitudes of people is the first step towards prevention of such diseases. In addition to knowledge and attitude, another item named self-efficacy is also evaluated. This concept means confidence in one's ability to take the necessary measures to achieve the specific goal which in fact reflects their knowledge and attitude in their actual performance (Kim and Kim, 2015).

In general, conflicting results about nutritional awareness have been reported in few studies using this model (Acheampong and Haldeman, 2013). Our findings replicate and extend Zhang *et al.*'s achievements; there is a significant difference in feeding behavior of people with the knowledge and attitudes (Zhang *et al.*, 2013). Previous studies mostly assessed a limited age group, gender, or job category that reduced comparability. But in this study, an acceptable population in terms of participants' number and age distribution was recruited.

The role of nutrition in human health is obvious, but progressive prevalence of CVDs in Iran raised questions of "Is nutritional knowledge of the society weak in this area? or "Is people's performance commensurate with their knowledge?". Therefore this study was conducted to assess the perceived knowledge, attitude, and self-efficacy of Kerman people about the eating behaviors in prevention of cardiovascular diseases.

Materials and Methods

Study design and participants: This descriptive-

analytical cross-sectional study started in January and lasted to March 2015. Participants selected through multi-stage sampling method, consisted of 400 men and women living in the city of Kerman. . First, the city was divided into five regions of North, South, East, West, and center, two health centers were then randomly selected from each region; a total of ten health centers were investigated. Later, using multistage random sampling, 40 people (20 males and 20 females) were selected from residents of the area covered by each health care center. Trained interviewers referred to participants' houses to complete the questionnaires. Inclusion criteria consisted of being Iranian, literate, in the age range of 20 - 60 years, and having the willingness to cooperate. Of 400 completed questionnaires, 32 questionnaires were excluded due to failure in responding all items or being out of the study age range. The validity of the questionnaire used to collect data was confirmed by a panel of experts (including 6 professors and experts from the Health and Nutrition Department). Its internal reliability was also confirmed through Cronbach's alpha coefficient (0.84) and retest method (0.71).

Measurements: The questionnaire were composed of four parts; the first part was related to demographic information (including age, gender, marital status, education, job, economic situation, and the number of family members), the second part included 14 items about knowledge, for example "High-fat dairy consumption is associated with heart disease", the third part contained 15 questions about attitudes, for instance the effects of diet on cardiovascular health, and the fourth part included 6 items related to self-efficacy, for example "I can use low-salt foods". Knowledge, attitude, and self-efficacy questions were supposed to be answered on a three-point (true, false, do not know) or a five-point Likert scale (strongly agree to strongly disagree). To compare these structures better, all of them using the equation method, were changed into number scores; from 0 -100.

Data analysis: The collected data were then analyzed by SPSS software ²². Central index, dispersion, number, and percentage were used to

describe the information. Student *t*-test, chi-square, and logistic regression were further applied to analyze the data. In the logistic model, significant variables at level of 0.2 were selected as important variables and were entered into the multivariate logistic regression model and variables significant at level of 0.05 were presented using backward method.

Results

The mean age of participants including 202 women (54.9%) and 166 men (45.1%) was 35.7 ± 11.45 years. Overall mean knowledge score was 84.15 ± 10.7 and the difference between men (85.62 ± 10.04) and women (82.3 ± 11.24) was statistically significant ($P = 0.003$). The overall average score of attitude was 47.84 ± 7.67 and there was a statistically significant difference ($P < 0.001$) between men (49.11 ± 7.95) and women (46.30 ± 7.04). The overall average score of perceived self-efficacy was 59.10 ± 16.57 which was significantly different ($P < 0.001$) between women (62.90 ± 15.96) and men (54.40 ± 16.2). State of knowledge, attitude, and self-efficacy of men and women are respectively shown in **Tables 1** and **2**.

Knowledge: The results of logistic regression showed that these variables did not have any significant effect on men's knowledge or knowledge. But, as body mass index (BMI) shows the investigation of these variables in women shows lower chance of gaining knowledge in women with moderate BMI compared to obese women.

Attitude: According to **Table 3**, the chance of having moderate to low attitude in men with a college education is 2.5 times more than those who have diploma or lower education ($P = 0.01$). Chance of having moderate to low attitude in men with incomes of over 20 million Rials is 3.7 times higher than those with incomes lower than 10 million Rials ($P = 0.007$). Individuals with income range of 10-20 million Rials do not show any significant difference in terms of attitudes with people with income below 10 million Rials ($P = 0.11$). It was observed in this study that demographic variables do not have any effect on women's attitudes.

Perceived self-efficacy: According to **Table 3**, the only significant variable in a logistic ranking model among men was their knowledge about health status. Men aware of their health status had a higher chance of self-efficacy (2.8 times more) than those who were not aware of their health status ($P = 0.001$). Other

demographic variables did not have any effect on self-efficacy.

As it can be seen in **Table 3**, the same study on women showed that the chance of having high self-efficacy in full-time employees is 2.05 times more than others. Other variables were not significant.

Table 1. The relationship between demographic variables and knowledge, attitude and perceived self- efficacy in males

Variables	Knowledge			Attitude			Perceived self- efficacy			
	Low & intermed iate	high	p-value ^a	low	Interme diate	p-value	low	Interme diate	high	p-value
Age (year)										
20 - 40	17(14.8) ^b	98(85.2)	0.23	76(66.1)	39(33.9)	0.94	45(39.1)	49(42.6)	21(18.3)	0.79
40 - 60	8(15.7)	43(84.3)		34(66.7)	17(33.3)	0.94	17(33.3)	26(51)	8(15.7)	
Body mass index (kg/m ²)										
<19.8	1(5.9)	16(94.1)	0.19	12(70.6)	5(29.4)	0.68	7(41.2)	8(47.1)	2(11.8)	0.98
19.8 – 25	12(21.4)	44(78.)		39(69.6)	17(30.4)		18(32.1)	28(50)	10(17.9)	
>25	12(12.9)	81(87.1)		59(63.4)	34(36.6)		37(39.8)	39(41.9)	17(18.3)	
Education										
Diploma and less	17(18.9)	73(81.1)	0.13	70(77.8)	20(22.2)	0.001	37(41.1)	40(44.4)	13(14.4)	0.18
Collegiate	8(10.5)	68(89.5)		40(52.6)	36(47.4)		25(32.9)	35(46.1)	16(21.1)	
Occupation										
Fulltime	15(17.6)	70(82.4)	0.34	53(62.4)	32(73.6)	0.27	36(42.4)	33(38.8)	16(18.8)	0.50
Other	10(12.3)	71(87.7)		57(70.4)	24(29.6)		26(32.1)	42(51.9)	13(16)	
Married situation										
Single	11(23.9)	3(76.1)	0.48	32(69.6)	14(30.4)	0.58	15(32.6)	27(58.7)	4(8.7)	0.65
Married	14(11.7)	106(88.3)		78(65)	42(35)		47(39.2)	48(40)	25(20.8)	
Income (million toman)										
<1	12(17.6)	56(82.4)	0.67	54(79.4)	14(20.6)	0.002	26(38.2)	30(44.1)	12(17.6)	0.64
1 – 2	8(12.1)	58(87.9)		42(63.6)	24(36.4)		22(33.3)	31(47)	13(19.7)	
>2	5(15.6)	27(84.4)		14(43.8)	18(56.3)		14(43.8)	14(43.8)	4(12.5)	
Family History										
No	13(16.3)	67(83.7)	0.68	54(67.5)	26(32.5)	0.74	32(40)	34(42.5)	14(17.5)	0.64
Yes	12(14)	74(86)		56(65.1)	30(349.9)		30(34.9)	41(47.7)	15(17.4)	
knowing your health status										
No	19(19.4)	79(80.6)	0.06	71(72.4)	27(27.6)	0.43	43(43.9)	4(48)	8(8.1)	10.01
Yes	6(8.8)	62(91.2)		39(57.4)	29(42.6)		19(27.9)	28(41.2)	21(30.9)	

^a: Chi esquire test; ^b: N(%)

Table 2. The relationship between demographic variables and knowledge, attitude and perceived self- efficacy in females

Variables	Knowledge			Attitude			Perceived self- efficacy			
	Low & intermediate	high	p-value ^a	low	Intermediate	P-value	low	Intermediate	high	P-value
Age (year)										
20 - 40	11(7.6) ^b	133(92.4)	0.27	66(45.8)	78(54.2)	0.42	19(13.2)	81(56.3)	44(30.6)	0.86
40 - 60	2(3.4)	56(96.6)		23(39.7)	35(60.3)		11(19)	27(46.6)	20(34.5)	
Body mass index (kg/m ²)										
<19.8	1(3.6)	27(96.4)	0.046	14(50)	14(50)	0.32	3(10.7)	15(53.6)	10(35.7)	0.69
19.8 – 25	10(11.2)	79(88.8)		34(38.2)	55(61.8)		15(16.9)	46(51.7)	28(31.5)	
>25	83(2.4)	2(97.6)		41(48.2)	44(51.8)		12(14.1)	47(55.3)	26(30.6)	
Education										
Diploma & less	8(10.3)	70(89.7)	0.08	38(48.7)	40(51.3)	0.29	12(15.4)	44(56.4)	22(28.2)	0.46
Collegiate	5(4)	119(96)		51(41.1)	73(58.9)		18(14.5)	64(51.6)	42(33.9)	
Occupation										
Fulltime	0(0)	42(100)	0.05	14(33.3)	28(66.7)	0.11	4(9.6)	19(45.2)	19(45.2)	0.04
Other	13(8.1)	147(91.9)		75(46.9)	85(53.1)		26(16.3)	89(55.6)	45(28.1)	
Married situation										
single	7(9.7)	65(90.3)	0.15	36(50)	36(50)	0.2	14(19.4)	35(48.6)	23(32)	0.49
married	6(4.6)	124(95.4)		53(40.8)	77(59.2)		6(12.3)	73(56.2)	41(31.5)	
Income (million toman)										
<1	6(6.5)	87(93.5)	0.64	45(48.4)	48(51.6)	0.52	16(17.2)	52(55.9)	25(26.9)	0.11
1 – 2	4(5.1)	75(94.9)		32(40.5)	47(59.5)		10(12.7)	43(54.4)	26(32.9)	
>2	3(10)	97(90)		12(40)	18(60)		4(13.4)	13(43.3)	13(43.3)	
Family History										
No	3(3.4)	84(96.6)	0.13	38(43.7)	49(56.3)	0.92	15(17.2)	48(55.2)	24(27.6)	0.22
Yes	10(8.7)	105(91.3)		51(44.3)	64(55.7)		15(13)	60(52.2)	40(34.8)	
knowing your health status										
No	10(9.8)	92(90.2)	0.049	51(50)	51(50)	0.086	15(14.7)	62(60.8)	25(24.5)	0.13
Yes	3(3)	97(97)		38(38)	62(62)		15(15)	46(46)	39(39)	

^a: Chi esquire test; ^b: N(%)

Discussion

In this study, the average of nutritional knowledge was evaluated for all participants at optimal level (84.15 ± 10.7). BMI, education level, and knowledge of their health status in men affected their nutritional knowledge. However, in women, BMI, education level, occupation, marital status, family history, and knowledge of health status were effective on their nutritional knowledge. In addition, education level, occupation, and income affected men's attitudes, while the attitude of women was affected by occupation, marital status, and knowledge of their

health status. Perceived self-efficacy in men was influenced by the level of education, knowledge of health status, and occupation. Income and knowledge of the health created a significant difference in women's self-efficacy.

Results obtained through logistic regression showed that except BMI, none of the other demographic variables (only in women) were effective on nutritional knowledge. In most studies on the nutritional knowledge, it was evaluated as good. Knowledge score of high school girls in the study conducted by Heshmati was 70.13 ± 16.08 (Heshmati *et al.*, 2014). Haldeman determined

nutritional knowledge of African-American and Hispanic women at relatively good level (Acheampong and Haldeman, 2013). According to Ahadi, almost half of urban and rural housewives have good knowledge about their nutritional habits (0.4% - 70%) (Ahadi *et al.*, 2014). Nutritional knowledge of students in the study of Eman was also good (75% -94%), but only 18% to 39% of the students were aware of healthy cooking and identification methods of healthy foods (Alissa *et al.*, 2015). Half of the participants in Juan Zhang's study were aware of the relationship of sodium with hypertension, while women had better knowledge than men (Zhang *et al.*, 2013). In a study conducted by Zaborowicz *et al.* the

nutritional knowledge of all male and female students was moderately satisfactory (Zaborowicz *et al.*, 2016). However, in several other studies different results were obtained; this may be due to differences in participants' demographic characteristics and the difficulty degree of questions. According to Sharma *et al.* more than 60% of participants did not have enough nutritional knowledge and none of the teachers responded to all knowledge questions (5 questions) correctly (Sharma *et al.*, 2013). Anna Kottajtis also reported inadequate level of nutritional knowledge among participants (Kottajtis-Dołowy and Żamojcin, 2016).

Table 3. The Factors affecting of study variables using logistic regression model

Variables	OR (%95 C.I)	P-value ^a
Women's knowledge		
Body mass index (kg/m ²)		
<19.8	Reference group	
19.8 – 25	0.24(0.06 , 0.99)	0.05
>25		
Education		
Diploma & less	Reference group	
Collegiate	4.7(1.3 ,17.06)	0.019
Married situation		
Single	Reference group	
Married	4.6(1.3 , 16.6)	0.019
Attitudes of men		
Education		
Diploma & less	Reference group	
Collegiate	2.5(1.24 , 5.03)	0.01
Income (million toman)		
<1	Reference group	
1 – 2	1.89(0.85 , 4.2)	0.11
>2	3.7(1.44 , 9.6)	0.007
Perceived self-efficacy of men		
Knowing your health status		
No	Reference group	
Yes	2.8(1.5 ,5.1)	0.001
Perceived self-efficacy of women		
Occupation		
Other	Reference group	
Fulltime	2.05(1.06 , 3.9)	0.03

^a: logistic regression

In this study, the attitude of participants was poor. Level of education, occupation, and income were effective on men's attitude. Women's attitudes were affected by occupation, marital status, and knowledge of their health status. The final results of logistic regression determined that a high level of education and an income of more than 20 million Rials per month had a positive impact on men's attitudes. In other words, there was no significant difference for the income above of 20 million Rials. The results of other studies on the attitude were inconsistent with these findings. The probable reason for this paradox can be related to policy differences, participants' age or etc. Overall attitude of the participants in Haldeman's study was positive (Acheampong and Haldeman, 2013). The majority of families (54% -96%) had a good attitude towards the basic rules of nutrition. Ahadi (Ahadi *et al.*, 2014) reported that more than 75% of teachers participating in the study of Sharma agreed with the fact that "what they eat affects their health", while they did not have good performance (Sharma *et al.*, 2013). About 80% of participants in the study conducted by Juan Zhang were also interested in sodium diet and men tended to use sodium more than women (Zhang *et al.*, 2013).

Perceived self-efficacy of participants in the study was at moderate level (in preliminary results), level of education and knowledge of health status also affected the self-efficacy. Women's self-efficacy was affected by occupation, income, and knowledge of their health status. Results of ranking logistic model showed that the chance of high self-efficacy in men who are aware of their health status is 2.8 times more than those who were not aware of their health status ($p = 0.001$) and other demographic variables had no effect on self-efficacy. Annual periodic tests and health status awareness in people with high risk factors may lead to early diagnosis and sensitize them to the diet. This is known as the perceived threat in health education and increases self-efficacy. The results showed that the chance of having high self-efficacy in women who were full-time employees was 2.05 times more than

other women; other demographic variables were not significant. Employment and having independent salary increase sense of confidence and was effective on women's self-efficacy. At the same time in the Chi-square test it was revealed that the income of women also affects their self-efficacy. Women's high self-efficacy as the family hub can modify and promote household eating behaviors. Similar studies indicate that American women's self-efficacy was relatively good. Haldeman showed that self-efficacy of African-American women was considerably higher than Hispanic women (Acheampong and Haldeman, 2013). Juan Zhang indicated that 28 % of participants consumed too much salt in their daily diet (Zhang *et al.*, 2013). In eating behavior of students in Zaborowicz's study, there was no significant difference according to gender, men used salty snacks more than women, and added sugar to their drinks (Zaborowicz *et al.*, 2016).

According to the differences in scores of knowledge, attitude, and perceived self-efficacy on healthy eating behavior among women and men, it is suggested to conduct qualitative studies. Causes of these differences and ways of promoting them should be investigated; such studies should also be conducted in other parts of the country to provide a better comparison about these differences. Given the importance of healthy eating behaviors in prevention from cardiovascular diseases, it is recommended to provide a better planning at the level of health policy-making to improve the attitude and self-efficacy of people, especially men.

Conclusion

Participants' knowledge in this study was appropriate, self-efficacy was in the middle level, but participants' attitude was poor. Women have an average self-efficacy significantly higher than men. Due to the high level of public knowledge, proper eating behaviors are possibly affected by other factors such as attitude, skills, and environmental factors. But the knowledge, attitude, and self-efficacy of participants showed that education,

income, and participants' awareness about health status have a significant impact on improving attitude and self-efficacy of the community (regardless of individuals' gender).

Acknowledgments

Kerman University of Medical Sciences has fully funded this research. Authors would like to thank Kerman University of Medical Sciences' staffs for their continued attention and financial support. Authors' thanks are also extended to all the participants whose close cooperation facilitated completion of this study.

References

- Acheampong I & Haldeman L** 2013. Are nutrition knowledge, attitudes, and beliefs associated with obesity among low-income Hispanic and African American women caretakers? *Journal of obesity*. **2013**.
- Ahadi Z, et al.** 2014. Knowledge, attitude and practice of urban and rural households towards principles of nutrition in Iran: results of NUTRIKAP survey. *Journal of diabetes & metabolic disorders*. **13 (100)**.
- Ahmadi A, et al.** 2015. Current status of the clinical epidemiology of myocardial infarction in men and women: A national cross-sectional study in Iran. *International journal of preventive medicine*. **6 (1)**: 14.
- Alissa EM, et al.** 2015. Knowledge, attitude and practice of dietary and lifestyle habits among medical students in King Abdulaziz University, Saudi Arabia. *International journal of nutrition and food sciences*. **4 (6)**: 650-655.
- Alwaili K, Alrasadi K, Awan Z & Genest J** 2009. Approach to the diagnosis and management of lipoprotein disorders. *Current opinion in endocrinology, diabetes and obesity*. **16 (2)**: 132-140.
- Asl PR, Hooman Khademi M, Farhad Islami M, Akram Pourshams M & Paolo Bofetta M** 2015. Cardiovascular disease mortality and years of life lost attributable to non-optimal systolic blood pressure and hypertension in

Author contributions

Mohseni M and Ahmadi Tabatabaei V designed and supervised the study. Jahani V analyzed the data. Rad Merikhi S and Rajizadeh A designed the study, selected population, collected and analyzed data. All authors participated in writing the manuscript, critically reviewed, and approved the final version submitted for publication.

Conflicts of interest

The authors declare that they have no conflict of interest. This article

northeastern Iran. *Archives of Iranian medicine*. **18 (3)**: 144.

- Bai G, et al.** 2016. Adherence to a healthy lifestyle and a DASH-style diet and risk of hypertension in Chinese individuals. *Hypertension research*. **40 (2)**: 196-202.
- Björklund G & Chirumbolo S** 2017. Role of oxidative stress and antioxidants in daily nutrition and human health. *Nutrition*. **33**: 311-321.
- Ghaffari S, Hakim H, Pourafkari L, Asl ES & Goldust M** 2013. Twenty-year route of prevalence of risk factors, treatment patterns, complications, and mortality rate of acute myocardial infarction in Iran. *Therapeutic advances in cardiovascular disease*. 1753944712474093.
- Haghdoust A & Mirzazadeh A** 2006. Familial aggregation of coronary heart. disease risk factors in kerman province. *Iranian journal of epidemiology*. **1 (3)**: 7-12.
- Hayek A, et al.** 2016. An integrated general practice and pharmacy-based intervention to promote the use of appropriate preventive medications among individuals at high cardiovascular disease risk: protocol for a cluster randomized controlled trial. *Implementation science*. **11 (1)**: 129.
- Heshmati H, Behnampour N, Homaei E & Khajavi S** 2014. Predictors of fruit and vegetable consumption among female high

- school students based on PRECEDE model. *Iranian journal of health education and health promotion*. **1** (4): 5-14.
- Kim MJ & Kim KW** 2015. Nutrition knowledge, outcome expectations, self-efficacy, and eating behaviors by calcium intake level in Korean female college students. *Nutrition research and practice*. **9** (5): 530-538.
- Kollajtis-Dolowy A & Żamojcin K** 2016. The Level of Knowledge on Nutrition and its Relation to Health among Polish Young Men. *Roczniki państwowego zakładu higieny*. **67** (2): 155-161.
- Lloyd-Jones D, et al.** 2009. Heart disease and stroke statistics—2009 update a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*. **119** (3): e21-e181.
- Maracy MR, et al.** 2015. Burden of ischemic heart diseases in Iran, 1990-2010: Findings from the Global Burden of Disease study 2010. *Journal of research in medical sciences*. **20** (11): 1077.
- Mohammadifard N, Talaei M, Gharipour M, Sadeghi M & Esmailzadeh A** 2016. Dietary patterns and mortality from cardiovascular disease: isfahan cohort study. *European journal of clinical nutrition*. **170**: 1-7.
- Rezazadeh A, Rashidkhani B & Omidvar N** 2010. Association of major dietary patterns with socioeconomic and lifestyle factors of adult women living in Tehran, Iran. *Nutrition*. **26** (3): 337-341.
- Sadeghi M, Ahmadi A, Baradaran A, Masoudipoor N & Frouzandeh S** 2015. Modeling of the relationship between the environmental air pollution, clinical risk factors, and hospital mortality due to myocardial infarction in Isfahan, Iran. *Journal of research in medical sciences*. **20** (8): 757.
- Sharma S, et al.** 2013. Nutrition-Related Knowledge, Attitudes, and Dietary Behaviors among Head Start Teachers in Texas: A Cross-Sectional Study. *Race/ethnicity*. **50** (27): 16.11.
- Sjögren P, et al.** 2010. Simple advice on lifestyle habits and long-term changes in biomarkers of inflammation and vascular adhesion in healthy middle-aged men. *European journal of clinical nutrition*. **64** (12): 1450-1456.
- Tabatabaei-Malazy O, et al.** 2014. Prevalence of dyslipidemia in Iran: a systematic review and meta-analysis study. *International journal of preventive medicine*. **5** (4): 373.
- Talebizadeh N, Haghdoust A & Mirzazadeh A** 2009. An epidemiological model (Markov Chain) of cardiovascular disease in Iran. *Payesh*. **8** (2): 163-170.
- Uthman OA** 2016. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet neurology*. **388** (10053): 1659-1724.
- WHO** 2014. Cardiovascular diseases. Geneva, Switzerland.
- WHO** 2015. Global Status Report on Noncommunicable Diseases 2014. (ed. s. ed). World Health Organization: Geneva, Switzerland.
- Zaborowicz K, et al.** 2016. Evaluation of selected dietary behaviours of students according to gender and nutritional knowledge. *Roczniki państwowego zakładu higieny*. **67** (1): 47.
- Zhang J, et al.** 2013. Dietary sodium intake: Knowledge, attitudes and practices in Shandong province, China, 2011. *PloS one*. **8** (3): e58973.