



## Evaluation of Risk Factors for Cardiovascular Diseases in Pregnant Women Referred to Golestan Hospital in Ahvaz

Behnam Gholizadeh<sup>1</sup>, Seyed Salaheddin Nabavi<sup>2</sup>, Siamak Baghaei<sup>3</sup>, Fatemeh Javaherforoosh Zadeh<sup>4</sup>, Ehsan Moradi-joo<sup>5</sup>, Reza Amraie<sup>6</sup>, Amirhossein Baghaei<sup>7</sup>, Mahin Najafian<sup>8\*</sup>

<sup>1</sup>Department of General Surgery, School of Medicine, Golestan Hospital, Ahvaz Anesthesiology and Pain Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>2</sup>Department of General Surgery, School of Medicine, Imam Khomeini Hospital, Ahvaz Anesthesiology, and Pain Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>3</sup>Ahvaz Branch, Islamic Azad University, Ahvaz, Iran.

<sup>4</sup>Ahvaz Anesthesiology and Pain Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>5</sup>Clinical Research Development Unit, Aria Private Hospital, Ahvaz Anesthesiology, and Pain Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>6</sup>Department of Psychiatric, Faculty of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>7</sup>Tehran Medical Science Branch, Islamic Azad University, Tehran, Iran.

<sup>8</sup>Department of Obstetrics and Gynecology, School of Medicine, Fertility Infertility and Perinatology Research Center, Imam Khomeini Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

### ABSTRACT

The existence of modifiable risk factors of cardiovascular diseases of mothers before pregnancy is associated with the risk of preterm childbirth and low birth weight. This study aimed at determining the risk factors of cardiovascular diseases in pregnant women referred to Golestan Hospital in Ahvaz. This is a descriptive-analytical study performed in a cross-sectional way in 2020. The study population consisted of 200 pregnant women referred to Golestan Hospital in Ahvaz. Because of the restricted size of the statistical population, no sampling was done. For purpose of data collection, a two-part questionnaire (questionnaire and laboratory findings) was used. Data analysis was done using linear regression, t-test, and one-way analysis of variance (ANOVA) at sig level of 0.05 by SPSS22 software. The majority of pregnant women (45%) were in the age range of 30-40 years old. The highest portion of risk factors of cardiovascular diseases was respectively associated with smoking in the family (77.5%), smoking by the person (60%), history of hyperlipidemia (47.5%), and stress (42.5%). The lowest portion causing the disease was associated with inadequate nutritional behavior (30%), diabetes (35%), hypertension (37.5%), and history of cardiovascular disease in first-degree relatives (40%). According to obtained results and high prevalence of risk factors of cardiovascular diseases, especially smoking and hyperlipidemia in pregnant women, it is essential to make careful plans for continuous training to change the lifestyle such as good nutrition, exercising, and regular physical activity as effective solutions to decrease the prevalence of cardiovascular diseases.

**Keywords:** Risk factors, Cardiovascular diseases, Pregnant women, Ahvaz.

**HOW TO CITE THIS ARTICLE:** Gholizadeh B, Nabavi SS, Baghaei S, Zadeh FJ, Moradi-joo E, Amraie R, et al. Evaluation of Risk Factors for Cardiovascular Diseases in Pregnant Women Referred to Golestan Hospital in Ahvaz. Entomol Appl Sci Lett. 2021;8(3):40-5. <https://doi.org/10.51847/ritqMnNbZB>

**Corresponding author:** Mahin Najafian

**E-mail** ✉ [najafian-m@ajums.ac.ir](mailto:najafian-m@ajums.ac.ir)

**Received:** 02/05/2021

**Accepted:** 24/08/2021

## INTRODUCTION

Cardiovascular diseases can cause about 17% of mortality per year [1]. In the United States, every year 610,000 people die as a result of cardiovascular diseases [2]. Non-communicable disease is one of the early causes of death in the UN; although it has had decreasing process over the recent years [3]. The diseases have been the first cause of mortality in Iran with more than 35% of total mortality [4], and the value is being increased as time goes [5].

The most underlying risk factors of cardiovascular diseases can be hypertension, cholesterol and hyperlipidemia, diabetes, overweight and obesity, improper diet, smoking, and inactivity [6]. The studies have shown that interventions in changing lifestyles such as increasing physical activity, improper diet, and lack of smoking can prevent the diseases to a high extent [7].

Understanding the risk factors can create an underlying perspective in the field of prevention, etiology, period, and treatment of the disease [8]. In the study conducted by Grau *et al.*, respectively 97.4% and 97.2% of studied people from France and Spain showed at least one of the risk factors including hypertension, dyslipidemia, diabetes, smoking, and obesity [9]. In the study conducted based on Framingham Model in Korea, about 9.1% of men and 2.6% of women were at risk [10].

Although cardiovascular was common among men from past times, it has been specified now that the disease can be a threat to the health of women, too. In the study conducted by Tan *et al.*, risk factors such as smoking, hyperglyceridemia, and low high-density lipoprotein cholesterol levels showed a higher impact in women compared to men, and the difference increases the importance of considering the health problem in both genders [11].

In the study conducted by Navid Sattar *et al.* (2002), it was found that the existence of modifiable risk factors of cardiovascular diseases before pregnancy is along with the increased risk of preterm childbirth and low birth weight [12]. There was a significant correlation between the lifestyle of the mother during pregnancy and the birth weight of the infant. In the study conducted by Ghavi *et al.* (2012), mothers with weak activity, rest, and

social relations during pregnancy showed an increased level of low birth weight respectively at 8.87 and 4.73 times compared to those with the proper situation. Besides, there was a significant correlation between low birth weight and nutrition during pregnancy [13].

Studies show that there is a significant correlation between cardiovascular disease and pregnancy hypertension, gestational diabetes, using tobacco, iron deficiency anemia, maternal thyroid problems, oral and dental problems, and history of gestational bleeding, and the probability of low-weighted infant birth [14]. Women showed less mortality than men of the same ages caused by cardiovascular diseases [15]. This can show that estrogen has a protective effect on women before menopause [16].

As pregnancy naturally causes some changes in the cardiovascular system, which are similar to cardiovascular diseases and can make it difficult to diagnose the disease, identifying risk factors is vital to diagnose and treat the cardiovascular diseases properly. It can help taking wide extended educational interventions to enhance the awareness, change behavior, attitude, and performance of pregnant women on the lifestyle and the awareness of officials of preliminary prevention of risk factors. Hence, this study aimed at determining the risk factors of cardiovascular diseases in pregnant women referred to Golestan Hospital in Ahvaz.

## MATERIALS AND METHODS

This cross-sectional study was done in 2020. The statistical population consisted of 200 pregnant women referred to Golestan Hospital in Ahvaz. Because of the restricted size of the population, sampling was not done.

The inclusion criteria included satisfaction to participate in this study and history of cardiovascular diseases. The exclusion criteria included dissatisfaction to participate in the study.

For data collection, a two-part questionnaire (questionnaire and laboratory findings) was used. In the first part, the demographic information of pregnant women including age, education level, BMI, satisfaction by the financial status of the family, job, and residential place was analyzed.

In the second part (laboratory findings), systolic and diastolic blood pressure, total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides, and fasting blood sugar were tested. After 8-10hrs of fasting, 5cc blood was taken and was transferred to the laboratory in standard laboratory tubes as soon as possible. The blood pressure was measured using a mercury barometer with an accuracy of 2 mm Hg from the right hand and after 90min resting.

After getting permission from Golestan Hospital, the questionnaires were distributed and collected within three months. In the first phase, the author referred to the patients, explained the purposes of the study, and delivered the questionnaires. After a week, the author again referred to collect the fulfilled questionnaires. In the laboratory part, the results were collected after presenting explanations and doing experiments by the patients.

The collected data was analyzed using SPSS23, and indices such as frequency, mean value, percentage, linear regression methods, t-test, and ANOVA were used. The sig level was considered below 0.5 (p-value<0.5).

## RESULTS AND DISCUSSION

70 (35%) of studied women were in the age range of 20-30 years old; 90 (45%) were in the age range of 30-40 years old, and 40 (20%) women were in the age range of 40-50 years old. The majority of the women were below diploma (n=85). 110 (55%) women were living in the village, and 90 (45%) were living in the city. Only 38 (19%) women were smokers, and the other 162 (79%) women were not a smoker. In terms of the BMI, 55 (27%) women were thin, 70 (35%) were normal, 60 (30%) were overweighted, and 15 (7.5%) were obese. Other demographic variables are presented in **Table 1**.

**Table 1.** Distribution of demographic information in pregnant women referred to Golestan Hospital in Ahvaz

demographic variables	descriptive statistics	
		No/percent
satisfaction by the financial status of the family	satisfied	40 (20%)
	almost satisfied	55 (27.5%)
	dissatisfied	105 (52.5%)
number of pregnancies	1	35 (17.5%)

	2	45 (22.5%)
	more than 2 times	120 (60%)
job	housewife	130 (65%)
	employed	70 (35%)

The highest portion of risk factors of cardiovascular diseases was respectively associated with smoking in the family (77.5%), smoking by the person (60%), history of hyperlipidemia (47.5%), and stress (42.5%). The lowest portion in causing the disease was associated with improper nutrition (30%), diabetes (35%), hypertension (37.5%), and history of cardiovascular disease in first-degree relatives (40%) (**Table 2**).

**Table 2.** Distribution of risk factors of cardiovascular diseases in studied pregnant women

studied variables	descriptive statistics	
		No/percent
smoking in family		155(77.5%)
smoking by the person		120 (60%)
the hyperlipidemia		95 (47.5%)
stress		85 (2.5%)
history of cardiovascular diseases in first-degree relatives		80 (40%)
hypertension		75 (37.5%)
diabetes		70 (35%)
improper nutrition		60 (30%)

In this study, 38 (19%) of women were a smoker. In a study done in Kerman, 10.25% of women were smoking [17]. In Qazvin, 8% of women reported smoking [18]. In a study in Bushehr, 19.05% of women were using tobacco, and 0.7% were smokers [19]. The results of this study showed a high level of smoking in pregnant women of Ahvaz compared to other regions.

The results obtained from the study showed that 70 (35%) women were overweight in terms of BMI. In a study conducted in Kerman, BMI was the most common risk factor for cardiovascular diseases [20]. Changes in lifestyle such as unhealthy nutrition and decreased physical activity have caused women to be overweight. The results of the study showed that the majority of pregnant women (52.5%) were dissatisfied with their financial situation. Besides, the majority of them had low educational levels (85 women below diploma). The investigations showed that a higher educational level is associated with decreased

cardiovascular risk factors [21]. According to the findings of the study in China, the least prevalence of hypertension was observed in people with higher education degrees [22]. Maybe the reason is more awareness of educated people about diet and least salt consumption.

The highest portion of risk factors for cardiovascular diseases was respectively associated with smoking in the family, smoking by the person, and history of hyperlipidemia. Another study showed that using fried foods (97.9%), sweets (67.9%), and fatty foods (66.7%) were insignificant correlations with cardiovascular diseases. On the other hand, smoking doubles cardiovascular risk [23].

In this study, stress is one of the risk factors of cardiovascular diseases. In a prospective study done on 40 to 50-year-old people in Japan, women reporting a high level of stress showed doubled risk of death by stroke and heart attack compared to other women [24]. In the meta-analysis done by Roest *et al.*, the findings of 20 articles showed that anxious people were mostly exposed to cardiovascular diseases and death caused by that [25].

In this study, diabetes (35%) was one of the risk factors of cardiovascular diseases. In the study conducted by Karami *et al.*, diabetes in women was more than in men (8.1%) [26]. The reason for the difference in findings may be the difference in age range, race, and lifestyle.

According to obtained results, improper nutrition and diet are other risk factors for cardiovascular diseases. The Cohort studies showed that a healthy diet is significantly correlated to decreased risk of ischemia, stroke, and coronary artery diseases (CAD) in women [27]. Haghightdoost *et al.* found that a healthy diet was in reverse correlation with all risk factors of cardiovascular diseases in women [28]. Nowadays, due to the employment of women and time restrictions, it may be impossible for everyone to have a healthy diet all the time. Besides, increased consumption of fast foods in Ahvaz City can lead to an unhealthy lifestyle.

The results obtained from this study showed that the BMI and smoking were in positive and significant correlation with the majority of risk factors of cardiovascular diseases, such as hypertension and hyperlipidemia ( $p > 0.05$ ). Gus

*et al.* [29] showed that there is a significant correlation between BMI above 27 and increased hypertension. According to another study, with an increase in BMI, the probability of the incidence of cardiovascular diseases, high LDL, hypertension, diabetes, and low HDL increased so that the chance was doubled with an increased level of BMI of more than 25. The results were consistent with the findings of this study. In this study, hypertension was one of the risk factors of cardiovascular diseases in pregnant women (37.5%). In Spain, 33.7% of patients were suffering from hypertension [30].

## CONCLUSION

According to the results obtained from this study and the high prevalence of risk factors of cardiovascular diseases, especially smoking and hyperlipidemia in pregnant women, it is essential to make careful plans for continuous education to change the lifestyle, such as proper nutrition, exercising, and regular physical activity as effective solutions to decrease the prevalence of cardiovascular diseases.

**ACKNOWLEDGMENTS:** We hereby thank the cooperation and participation of the staff of Golestan Hospital in collecting the data of the research project approved by the Vice-Chancellor for Research and Technology of Ahvaz Jundishapur University of Medical Sciences with the ID IR.AJUMS.REC.1399.805.

**CONFLICT OF INTEREST:** None

**FINANCIAL SUPPORT:** None

**ETHICS STATEMENT:** None

## REFERENCES

1. Heidari MR, Musavi F, Gholizadeh B. The Effect of Holy Quran Voice on Pain and Hemodynamic Indices after Cardiac Surgery: A Randomized Clinical Trial. *Jundishapur Sci Med J.* 2019;18(5):435-47.
2. Berríos-Torres SI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR, et al. Centers for disease control and prevention guideline for the prevention of surgical site infection, 2017. *JAMA Surg.* 2017;152(8):784-91.

3. Malvezzi M, Carioli G, Bertuccio P, Negri E, La Vecchia C. Relation between mortality trends of cardiovascular diseases and selected cancers in the European Union, in 1970–2017. Focus on cohort and period effects. *Eur J Cancer*. 2018;103:341-55.
4. Javaherforooshzadeh F, Abdalbeygi H, Janatmakan F, Gholizadeh B. Comparing the effects of ketorolac and Paracetamol on postoperative pain relief after coronary artery bypass graft surgery. A randomized clinical trial. *J Cardiothorac Surg*. 2020;15:1-8.
5. Shah Abadi S, Saidi M, Hazavehei SM, Bashiriyan S, Karami M, Marzbani B. Assessment of risk factors in patients with myocardial infarction and coronary artery disease: a needs assessment study. *J Sch Public Health Institute Public Health Res*. 2017;15(2):98-109.
6. Fakhri A, Hamedpour H, Pad Z, Hamedpour R, Mo-radi-Joo E, Binandeh M et al. Exercise Effect on Anxiety and Depression among Kidney Transplant Patients. *Entomol Appl Sci Lett*. 2020;7(2):77-82.
7. Javaherforooshzadeh F, Abdalbeygi H, Janatmakan F, Gholizadeh B. Comparing the effects of ketorolac and Paracetamol on postoperative pain relief after coronary artery bypass graft surgery. A randomized clinical trial. *J Cardiothorac Surg*. 2020;15:1-8.
8. Ramos-Lopez O, Mejia-Godoy R, Frías-Delgadillo KJ, Torres-Valadez R, Flores-García A, Sánchez-Enríquez S, et al. Interactions between DRD2/ANKK1 TaqIA Polymorphism and Dietary Factors Influence Plasma Triglyceride Concentrations in Diabetic Patients from Western Mexico: A Cross-sectional Study. *Nutrients*. 2019;11(12):2863.
9. Grau M, Bongard V, Fito M, Ruidavets JB, Sala J, Taraszkievicz D. Prevalence of cardiovascular risk factors in men with stable coronary heart disease in France and Spain. *Arch Cardiovasc Dis*. 2010;103(2):80-9.
10. Li C, He J, Wei B, Zhang X, Wang X, Zhang J, et al. Effect of metabolic syndrome on coronary heart disease in rural minorities of Xinjiang: a retrospective cohort study. *BMC Public Health*. 2020;20:1-8.
11. Tan YY, Gast GC, van der Schouw YT. Gender differences in risk factors for coronary heart disease. *Maturitas*. 2010;65(2):149-60.
12. Davis GK, Henry A, Arnott C, Brown MA. The long-term cardiovascular impact of hypertension in pregnancy—A missed opportunity. *Aust N Z J Obstet Gynaecol*. 2021;61(3):474-7.
13. Xi C, Luo M, Wang T, Wang Y, Wang S, Guo L, et al. Association between maternal lifestyle factors and low birth weight in preterm and term births: a case-control study. *Reprod Health*. 2020;17(1):1-9.
14. Moradi G, Khazaei Z, Esmailnasab N, Roshani D, Zokaii M, Ghaderi E, et al. The relationship between maternal diseases during pregnancy and low birth weight: A nested case-control study in rural areas of Kurdistan province (West of Iran). *Int J Pediatr*. 2017;5(8):5501-14.
15. Slack DJ, Safer JD. Cardiovascular Health Maintenance in Aging Individuals: The Implications for Transgender Men and Women on Hormone Therapy. *Endocr Pract*. 2021;27(1):63-70.
16. Zahmatkesh M, Barzeghar Khezri R. The effect of relaxation and instrumental music by Arnd Stein on quality of sleep and happiness among ageing women. *J Torbat Heydariyeh Univ Med Sci*. 2018;5(4):46-53.
17. Kharghani Z, Hoseinalizade MR, Ilati A, Yaghoubi S. Evaluating the average risk of cardiovascular disease in employees over 30 years of age in Shariati hospital in Mashhad in 1397. *Med J Mashhad Univ Med Sci*. 2019;61(6):1294-301.
18. Firoozabadi MD, Sheikhi MA, Rahmani H, Ebadi A, Heidari A, Gholizadeh B, et al. Risks of on-pump coronary artery bypass grafting surgery in patients with chronic obstructive pulmonary disease due to sulfur mustard. *Postepy Dermatol Alergol*. 2017;34(5):429.
19. Etemadian Y, Shabanpour B, Ramzanpour Z, Shaviklo A, Kordjazi M. Estimation and comparison of effective compounds in two algae species identified in Qeshm Island (Persian Gulf). *Iran J Fish Sci*. 2020;19(2):574-87.
20. Najafipour H, Nasri HR, Rostamzadeh F, Amirzadeh R, Shadkam M, Mirzazadeh A. Prevalence and incidence of pre-hypertension and hypertension

- (awareness/control) in Iran: findings from Kerman coronary artery diseases risk factors study 2 (KERCADRS). *J Hum Hypertens.* 2020;1-2.
21. Akbari Z, Mohammadi M, Effati B, Aboalkhirian S, Barati H. The Survey on the Prevalence of the Cardiovascular Diseases Risk Factors among the Qom University of Medical Sciences Staffs in 2012. *Paramed Sci Mil Health.* 2016;11(2):1-7.
  22. Yamori Y, Liu L, Mu L, Zhao H, Pen Y, Hu Z, et al. Diet-related factors, educational levels and blood pressure in a Chinese population sample: findings from the Japan-China Cooperative Research Project. *Hypertens Res.* 2002;25(4):559-64.
  23. Bahonar A, Sarrafzadegan N, Kelishadi R, Shirani S, Ramezani MA, Taghdisi MH, et al. Association of socioeconomic profiles with cardiovascular risk factors in Iran: the Isfahan Healthy Heart Program. *Int J Public Health.* 2011;56(1):37-44.
  24. Iso H, Date C, Yamamoto A, Toyoshima H, Tanabe N, Kikuchi S, et al. Perceived mental stress and mortality from cardiovascular disease among Japanese men and women: the Japan Collaborative Cohort Study for Evaluation of Cancer Risk Sponsored by Monbusho (JACC Study). *Circulation.* 2002;106(10):1229-36.
  25. Roest AM, Martens EJ, de Jonge P, Denollet J. Anxiety and risk of incident coronary heart disease: a meta-analysis. *J Am Coll Cardiol.* 2010;56(1):38-46.
  26. Karami M, Khosravi Shadmani F, Najafi F. Estimating the contribution of diabetes on the attributable burden of cardiovascular diseases in Kermanshah, West of Iran. *Iran J Epidemiol.* 2012;8(3):33-8.
  27. Xu Y, Wang L, He J, Bi Y, Li M, Wang T, et al. Prevalence and control of diabetes in Chinese adults. *JAMA.* 2013;310(9):948-59.
  28. Shan Z, Li Y, Baden MY, Bhupathiraju SN, Wang DD, Sun Q, et al. Association between healthy eating patterns and risk of cardiovascular disease. *JAMA Intern Med.* 2020;180(8):1090-100.
  29. Gus M, Fuchs SC, Moreira LB, Moraes RS, Wiehe M, Silva AF, et al. Association between different measurements of obesity and the incidence of hypertension. *Am J Hypertens.* 2004;17(1):50-3.
  30. Kwasny C, Manuwald U, Kugler J, Rothe U. Systematic review of the epidemiology and natural history of the metabolic vascular syndrome and its coincidence with type 2 diabetes mellitus and cardiovascular diseases in different European countries. *Horm Metab Res.* 2018;50(03):201-8.