

## Relationship between risk level, risk perception and preventive behaviors of myocardial infarction and stroke in people aged 30 to 60 years of Jiroft city, south of Iran in 2022

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### ABSTRACT

**Background:** Among non-communicable diseases, myocardial infarction (MI) and stroke are the most common cause of death in the world. The current study aimed to investigate the relationship between risk level and preventive behaviors of heart in people aged 30 to 60 years of Jiroft city in 2022.

**Methods:** This research was a cross-sectional study. The population under study is 383 middle-aged individuals (30-60 year) of Jiroft city with the combined sampling method. The data collection tools was researcher made, included demographic questions, risk perception questionnaires, and preventive behavior questions for MI and stroke. Information was analyzed by SPSSv21 software and further analyzed with descriptive statistics tests, chi-square test, independent t-test, one-way ANOVA, and Pearson correlation test at level 0.05.

**Results:** The participants' average age was  $41.26 \pm 8.32$  years. The highest percentage (51.4%) of middle-aged individuals had a risk level between 10 and 20% for cardiovascular diseases. The study investigated a significant correlation ( $p < 0.01$ ) between risk level, risk perception, and preventive behaviors for MI and stroke. Smoking and physical activity failed to reveal a significant correlation ( $p > 0.05$ ), but other dimensions of preventive behaviors correlated positively and significantly with the total score of preventive behaviors ( $p < 0.01$ ).

**Conclusion:** According to study findings, risk perception plays a significant role in influencing preventive behaviors for MI and stroke. It is recommended to conduct educational interventions to enhance understanding of the actual risk of MI and stroke, particularly among individuals with a high-risk assessment level. This would encourage the adoption of preventive behaviors in this population.

**Keywords:** Risk, Perception, Preventive, Behavior, Myocardial infarction, Stroke

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## Introduction

The main cause of death that poses a significant threat to public health worldwide is cardiovascular disease (CVD). Among these diseases, the highest mortality rate is related to ischemic heart diseases (1-3).

It is estimated that cardiovascular diseases kill 17.9 million individuals worldwide annually. More than four-fifths of deaths due to cardiovascular diseases are induced by MI and strokes, and one-third of these deaths occur in people under 70 years of age and prematurely (4).

With regard to the importance of the issue, the World Health Organization has declared ischemic heart diseases among the health priorities of developing countries since two decades ago (2).

According to the reports of the Ministry of Health in Iran, CVD is the primary cause of death and accounts for one million disability-adjusted life years (DALY) 46% of all deaths, and 20-23% of the disease burden (5). Therefore, it is necessary to have a comprehensive action plan to identify, prevent, and control the risk factors and occurrence of heart diseases and strokes (6).

One of the comprehensive action plans formulated and developed by WHO is the World Health Organization's package called Noncommunicable Disease Essential Package (WHO-PEN) to assess the capacity of primary health care centers (PHCs) for the prevention and control of non-communicable diseases used (7).

In this package, evidence-based interventions are structured as simple flow charts with clear referral criteria in clinical protocols and cardiovascular disease risk prediction tools, enabling health workers to identify those at highest risk of MI, and Stroke, amputation, and kidney failure are regarded as the targets (8).

Since social and environmental factors play a significant role in increased risk of MI and stroke, it is necessary to develop and implement solutions for high-risk groups as well as population-based solutions in society for the prevention and management of MI and stroke. Among these, the most crucial measures are working on the behavioral risk factors of MI and stroke (9). The

most important behavioral risk factors for heart disease and stroke contain unhealthy diet, inactivity, smoking, and alcohol consumption. Individuals may experience the effects of behavioral risk factors, such as increased blood pressure, increased blood glucose, increased blood lipids, and overweight and obesity (4).

Risk perception is the subjective assessment of the probability of a certain type of incident and the extent to which we are concerned about its consequences. Risk perception involves evaluating the probability as well as the consequences of a negative outcome (10). Many factors influence risk perception, including personality, experience, beliefs, age, gender, education level, knowledge, culture, and psychological background. Social and individual characteristics of a person can affect the way of thinking and reacting to risk and form the perception of risk (11).

Considering the importance of CVD and particularly MI and stroke in public health and its relationship with lifestyle-related behaviors, it is necessary to perform community-based health education measures to control CVDs (12). Since risk perception is determined as crucial for the formation of individual health prevention behaviors, it is necessary to investigate the perceived risk of MI and stroke disease to accomplished health education measures in this field (13).

Few studies have been conducted to examine the relationship between risk perception and preventive behaviors of MI and stroke, and since there is a limited concordance between actual and perceived risk in persons with CVD and the possibility of risk mismatch preventing the adoption of risk-reducing behaviors (14), the researchers made the decision to conduct a study to investigate the relationship between risk level, risk perception and preventive behaviors of MI and stroke in middle-aged individuals of Jiroft city, south of Iran, plan the necessary community-based interventions based on the results of the study, to improve behaviors associated with controlling behavioral risk factors related to MI and stroke.

## Methods

In this cross-sectional (descriptive-analytical) study, 383 middle-aged subjects (aged 30 to 60 years old) (15) from the city of Jiroft in the south of Iran were included in the study in 2022 with a combined sampling method (combination of cluster sampling, simple random and systematic random sampling). Each comprehensive health center in Jiroft city was first regarded as a cluster using the cluster sampling method, and 4 centers were chosen with simple random sampling. In each center, the list of middle-aged individuals who had assessed their risk of cardiovascular disease was taken from the apple system. The criteria for entering the research were to be over 30 years old, at least literate in reading and writing, the person's consent to participate in the research, and be a resident of Jiroft city. Moreover, the exclusion criteria included possessing a severe mental illness, not being able to speak clearly (according to the information of the Sib system), not cooperating, and not desiring to participate in the research process.

After identifying the samples, by phone explaining the purpose of the study, and assuring them that their information would remain confidential, they were invited to participate in the study if they wished and verbally give their informed consent to the health center and demographic questions, the risk perception and behavioral factors preventing MI and strokes questionnaire in a safe environment. Further, their risk assessment status was extracted from the Sib system and written in the questionnaire for each person.

The data collection tools was the researcher-made questionnaire consisted of demographic questions, risk assessment status and risk perception questions, and questions on preventive behaviors against MI and stroke. Demographic questions included age, sex, level of education, and individuals according to the information entered by the global WHO-PEN program and the corresponding Iranian program IraPEN, to the Sib system in the four states of risk assessment of cardiovascular diseases, including the risk below 10 percentage was between 10 and 20%, between 20 and 30% and the risk level was above 30% (15).

The risk perception questionnaire contained 21

questions. The options of the risk perception questions were composed of a 5-point Likert scale, the most appropriate option was assigned a score of 5 and the most inappropriate option was assigned a score of 1.

The questions of preventive behaviors against MI and strokes include 17 questions with a 5-point Likert scale with options from never to always with dimensions, nutrition with 7 questions, containing consumption of harmful fats, use of low-fat foods, use of high-salt food, use of red meat during the week, use of white meat (fish, etc.), consumption of fast food and sufficient consumption of fruits and vegetables in the daily diet. Physical activity with 2 questions, composing of walking short distances and doing regular physical activity. Tobacco and drugs with 2 questions including tobacco use and drug use. Follow-up of health status with 4 questions, including blood pressure control, routine tests, a timely visit to health centers for risk assessment and health care and timely visits by a doctor, and stress control with 2 questions, determining the ability to control disturbing and negative thoughts and feelings and the ability to control oneself in stressful situations. In total, a score between 17 and 85 was assigned to the questions of behavioral factors preventing heart and cerebral strokes.

Preventive behaviors of heart attack and stroke, obtaining a score above 75% of the attainable score was considered favorable, obtaining a score between 50 and 75% of the attainable score, average status, and obtaining a score lower than 50% of the obtainable score was regarded as weak (16). The validity of the questions was confirmed by the relevant experts, the validity of the questionnaire was performed by measuring the content validity indices, content validity ratio (CVR), and content validity index (CVI) and applying the opinions acquired from the panel of experts (7 health education specialists and 2 epidemiologists), and the obtained numbers for CVR and CVI were 0.89 and 0.92, respectively. and the reliability of the questions was performed with Cronbach's alpha method after completing 30 questionnaires, and for all variables, it was above 0.70.

After collecting the data, the information was

processed by SPSS version 21 software and analyzed with descriptive statistics tests, chi-square test, independent t-test, one-way ANOVA analysis of variance, and Pearson correlation test in level 0.05.

## Results

The present study was conducted to determine the relationship between risk level, risk perception, and preventive behaviors of MI and stroke in middle-aged people of Jiroft City, south of Iran.

Table 1 illustrates the status of the demographic

variables of the participants in this study, the mean and standard deviation age of the subjects was  $41.26 \pm 8.32$  years. Most of the individuals were in the age group of 30-40 years and more than 56% of them were females. The level of literacy was the highest number of participants in the bachelor study (32.9 %). Regarding the risk level of cardiovascular diseases in middle-aged persons, among 383 participants, the highest percentage (51.4%) was in the risk level between 10 and 20%.

**Table 1.** Status of demographic variables, risk level, as well as the mean and standard deviation of preventive behaviors of MI and strokes (n = 383)

Variables		Number	Percent
Age	30-40	202	52.7
	40-50	107	27.9
	50-60	74	19.3
Gender	Male	168	43.9
	Female	215	56.1
Literacy level	Unliterated	46	12
	Gidience	59	15.4
	Diploma	89	23.2
	Associate degree	43	11.2
	Bachelor	126	32.9
	Master	17	4.4
Risk level	Doctorial	3	0.8
	Under 10 percent	167	42.6
	10-20 percent	197	51.4
	20-30 percent	15	3.9
	Above 30 percent	4	1

The mean, standard deviation, the range of the obtainable score, and the percentage of the acquired score of the obtainable risk perception score are demonstrated in Table 2. None of the variables were in a favorable condition (getting a

score above 75% of the attainable score), the physical activity status with a score lower than 50% was in the poor range, and the status of other variables with a score between 50 and 75% of the attainable score is in average condition.

**Table 2.** Score of achievable score range, achieved score range, and the percentage of achieved score from the total achievable score of risk perception and preventive behaviors

Variable	Mean	SD	Achievable score range	Achieved score range	The percentage of achieved score from the total achievable score
Risk perception	60.57	9.34	17-85	25-85	71.25
Nutrition	19.73	3.97	7-35	7-27	56.37
Physical activity	4.06	2.52	2-10	2-10	40.60
Use of tobacco and drugs	5.91	1.94	2-10	2-10	59.1
Follow up on health status	13.73	2.69	4-20	4-19	68.65
Stress management	6.44	1.58	2-10	2-9	64.4
Preventive behaviors	50.06	8.64	17-85	17-72	58.89

Concerning the difference between risk perception and preventive behaviors in terms of demographic variables and risk level, there is a significant difference between gender and the total average of preventive behaviors ( $p = 0.024$ ), smoking ( $p = 0.000$ ), and follow-up of health status ( $p = 0.001$ ). Moreover, there was a statistically significant difference between the level of risk and all the investigated variables (in all cases  $p < 0.05$ ), Table 3.

The matrix of Pearson's correlation coefficient regarding the correlation between the level of risk perception of MI and stroke prevention behaviors

in middle-aged individuals is displayed in Table 4. The results unveil that there is a significant correlation between the level of risk with the perception of risk and preventive behaviors of MI and stroke (in all cases  $p < 0.01$ ). Regarding the dimensions of behavioral factors which prevent heart and stroke, other than physical activity and the total score of preventive behaviors and nutrition, as well as smoking and physical activity ( $p > 0.05$ ), between other dimensions of preventive behaviors and the total score of preventive behaviors there was a positive and significant correlation (in all cases  $p < 0.01$ ).

**Table 3.** The difference between risk perception and preventive behaviors according to demographic variables and risk level

Variables	Risk perception	Preventive behaviors	Nutrition	Physical activity	Smoking	Follow up on health status	Stress management	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
<b>Age</b>	30-40	60.99 ± 9.15	50.54 ± 8.44	19.83 ± 3.91	4.35 ± 2.65	5.85 ± 1.85	13.94 ± 2.63	6.40 ± 1.53
	40-50	58.87 ± 8.65	49.37 ± 8.52	19.36 ± 3.96	3.79 ± 2.54	5.92 ± 1.98	13.55 ± 2.68	6.55 ± 1.63
	50-60	61.90 ± 10.5	49.71 ± 9.36	20.83 ± 4.15	3.64 ± 2.01	6.05 ± 2.14	13.45 ± 2.86	6.40 ± 1.67
<b>p-value</b>	0.066	0.488	0.502	0.051	0.758	0.295	0.712	
<b>Gender</b>	Male	60.73 ± 9.38	48.93 ± 8.93	19.41 ± 3.99	4.04 ± 2.51	6.42 ± 1.95	13.20 ± 2.58	6.27 ± 1.64
	Female	60.45 ± 9.32	50.93 ± 8.32	19.98 ± 3.93	4.07 ± 2.54	5.51 ± 1.85	14.15 ± 2.69	6.57 ± 1.53
<b>p-value</b>	0.766	0.024	0.167	0.918	0.000	0.001	0.064	
<b>Literacy level</b>	Illiterate	60.15 ± 10.3	47.19 ± 9.90	19.47 ± 3.96	3.93 ± 2.50	6.13 ± 2.28	12.71 ± 3.06	6.10 ± 1.44
	Gidience	61.38 ± 8.11	49.67 ± 7.28	19.28 ± 3.62	4.52 ± 2.58	6.10 ± 2.01	13.45 ± 2.30	6.35 ± 1.62
	Diploma	58.94 ± 9.06	49.88 ± 8.63	19.89 ± 4.05	3.65 ± 2.19	5.92 ± 1.82	13.76 ± 2.69	6.43 ± 1.56
	Associate degree	60.74 ± 8.35	49.74 ± 7.39	19.09 ± 3.11	4.11 ± 2.69	5.81 ± 1.89	13.83 ± 2.72	6.62 ± 1.44
	Bachelor	61.27 ± 9.63	51.20 ± 8.45	20.38 ± 4.03	4.10 ± 2.58	5.81 ± 1.92	14.07 ± 2.41	6.54 ± 1.66
	Master	60.70 ± 12.24	51.52 ± 11.77	20.11 ± 5.25	4.41 ± 2.82	5.29 ± 1.64	14.52 ± 3.69	6.47 ± 1.77
	Doctorial	67.00 ± 5.29	54.66 ± 13.42	22.66 ± 3.78	4.66 ± 4.61	7.66 ± 2.08	14.33 ± 5.68	6.33 ± 1.52
<b>p-value</b>	0.495	0.183	0.066	0.546	0.462	0.092	0.764	
<b>Risk level</b>	Under 10 percent	57.25 ± 9.56	47.18 ± 8.69	18.61 ± 4.03	3.66 ± 2.40	6.30 ± 1.86	13.20 ± 2.76	6.07 ± 1.73
	10-20 percent	62.57 ± 7.89	51.62 ± 7.81	20.42 ± 3.63	4.28 ± 2.55	5.78 ± 1.93	14.06 ± 2.59	6.59 ± 1.38
	20-30 percent	67.53 ± 9.43	58.60 ± 6.12	22.00 ± 4.12	5.40 ± 2.79	4.00 ± 1.36	14.80 ± 2.14	8.20 ± 0.67
	Above 30 percent	75.25 ± 11.4	61.00 ± 4.24	24.00 ± 2.94	4.50 ± 3.00	3.25 ± 0.5	16.25 ± 2.06	7.50 ± 0.57
<b>p-value</b>	0.000	0.000	0.000	0.018	0.000	0.001	0.000	

**Table 4.** Matrix of Pearson's correlation coefficient of risk level, risk perception, and preventive behaviors of MI and stroke in middle-aged people

Variable	Risk level	Risk perception	Preventive behaviors	Nutrition	Physical activity	Smoking	Follow up on health status	Stress management
Risk level	<b>1</b>							
Risk perception	0.358**	<b>1</b>						
Preventive behaviors	0.343**	0.558**	<b>1</b>					
Nutrition	0.275	0.514**	0.817**	<b>1</b>				
Physical activity	0.152**	0.213**	0.062	0.089	<b>1</b>			
Smoking	-0.252**	-0.265	-0.519**	-0.442**	0.026	<b>1</b>		
Follow up on health status	0.199**	0.406**	0.770**	0.447**	0.326**	-0.310**	<b>1</b>	
Stress management	0.258**	0.308**	0.615**	0.380**	0.245**	-0.235**	0.423**	<b>1</b>

\*\*P-value < 0.01

## Discussion

The present study aimed to investigate the relationship between risk level and preventive behaviors of heart in persons aged 30 to 60 years of Jiroft city in 2022. The results manifested that 42.6% were at a risk level of less than 10% and 51.4% were at a risk level between 10% and 20%. However, in Jahani et al.'s study, 22.7% were at the medium risk level and 61.8% were at the low-risk level (less than 10%) (17). Also, in a study in 2020 that utilized the SCORE tool to assess the 10-year risk of Cardiovascular diseases, it was exhibited that in the investigated female participants, 53.8% were at low-risk level, 24.6% were at medium risk level and 24.6% were at high-risk level (18). In Kharqani et al.'s study, 100% of people over 30 years of age had a risk level below 10% (19). It suggests that the use of various tools in the evaluation and prevalence of risk factors in different societies and different age groups and genders in studies can be the reason for the difference in the results.

In the present study, none of the variables of risk perception and preventive behaviors of occurrence of MI and stroke were in the favorable condition (getting a score above 75% of the attainable score), the physical activity status with a score lower than 50% was in the poor range. And the status of other variables with a score between 50 and 75% of the attainable score is in the average status.

According to Guo et al.'s (2023) study, the majority of adults in southern China perceived CVD risk at a moderate (20). In the study of Dearborn et al. (2009), the status of primary care behaviors in stroke-prone women was not favorable (21).

Concerning the difference between risk perception and preventive behaviors in terms of demographic variables and risk level, there was a significant difference between gender and the total average of preventive behaviors not smoking, and follow-up of health status.

Based on the study of Guo et al. (2023), in accordance with the present study, women had a higher risk perception for the occurrence of MI and stroke (20). In Barnhart et al.'s (2009) study, men with high-risk perception scores consumed more

fat than women but exercised more (22). In Everett, et al.'s (2016) study, higher risk perception scores predicted an increased likelihood of enrollment in a cardiac rehabilitation program and adherence to a medication regimen, and there was no statistically significant difference between males and females in this regard (23).

In the current study, there was a significant difference between the risk level and the perception of the risk of MI and stroke, therefore, with the increase in the risk level, the average score of risk perception and preventive behaviors boosted. Meischke et al. (2010) declared, worse general health, more risk factors, and greater knowledge were associated with a greater perception of MI risk. Furthermore, the findings demonstrated that women who incorrectly responded that heart disease is not the leading cause of death among women in the United States reported having lower risk perceptions than those who correctly responded (24). Therefore, misconceptions about the risk of heart attack as well as stroke should be corrected.

The present study was conducted on people who had performed risk assessment and their knowledge should likely be concentrated more about the risk of MI and stroke. According to Abed et al. (2015), knowledge of risk factors independently explained a small amount of variance in risk perception (25).

Based on Dearborn et al. (2009), only 15.5% of women with heart disease identified their health status as a risk factor for stroke, and most of the women at risk perceived the risk of stroke as their peers (26). Therefore, despite the favorable awareness of several individuals at risk, their understanding level of risk is low and it is necessary to correct their perceived risk according to the risk assessment situation with educational interventions so that persons can engage in healthy and preventive behaviors

In the present study, there was a significant difference between the risk level and the preventive behaviors associated with MI and stroke, hence the average score of the preventive behaviors intensified with the increase of the risk level. Wu et

al.'s (2020) declared that the rate of high-risk health behaviors in individuals with stroke risk factors (including hypertension, diabetes, alcohol consumption, hyperlipidemia, and smoking) was the same as that of normal individuals (27). The difference between this issue and the other studies could be related to the fact that the risk assessment subjects were investigated, given the necessary training, and that their sensitivity and understanding of risk increased as a result.

According to Dearborn et al. (2009), individuals who rated the risk of MI or stroke as moderate were twice as likely to experience a future stroke or MI as those who assessed their risk of MI as low, while the persons who rated their risk as high were only slightly more at risk of morbidity or mortality (28).

Guo et al. (2023) identified that most adults in southern China had a moderate level of CVD risk perception. Older age, higher monthly income, diabetes, and better health status were significantly associated with higher perceived CVD risk. Individuals with high blood pressure, alcohol consumption, and better mental health status were connected with an underestimation of CVD risk (20). The level of risk perception can be effective in the behaviors which prevent the occurrence of heart attack and stroke. Therefore, it is necessary to identify individuals with unhealthy behaviors for various groups of society and also formulate and implement educational and non-educational interventions for them.

Based on Thakkar et al. (2015), patients with a correct perception of their disease risk reported higher smoking cessation rates and greater use of antiplatelet, antihypertensive, as well as statins (29). With regard to the limitations of the present study, it can be taken into consideration that the process of study conducting was long due to the lack of time for participants wished to refer to the health center in order to complete the questionnaire.

### Conclusion

The present study aimed to investigate the relationship between risk level and preventive

behaviors of heart in persons aged 30 to 60 years from Jiroft city in 2022.

In the present study, despite the relationship between risk level, risk perception and preventive behaviors of MI and stroke, risk perception and preventive behaviors and particularly physical activity are not favorable (risk perception score was higher than other variables, but still not favorable). Therefore, it is necessary to present messages based on understanding the real risk through the level of risk assessment in educational interventions relating to the preventive behaviors of MI and stroke, especially in the middle-aged persons, to boost the self-confidence of patients regarding preventive behaviors particularly nutrition and regular physical activity, stress management, not smoking and regular follow-up of health status are emphasized. In the risk assessment program, individuals who are at a risk level greater than 10% are also required to pay attention to the actual information about the severity of the disease and their vulnerability.

It is suggested to conduct analytical or interventional studies in the field of comparing diseases and conditions with low, medium, and high severity in persons and the short, medium, and long term in the field of cardiovascular diseases as well as comparing healthy and sick individuals with risk perception to examine the application of this model in various situations. Furthermore, it is possible to perform and compare the degree of predictability or the degree of impact of educational interventions based on risk perception and related theories and models.

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### Conflict of Interest

The authors have no conflict of interest to declare.

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### Ethical Considerations

Ethical considerations were carefully addressed and implemented in the research study, including obtaining informed consent from participants, ensuring their privacy and confidentiality, and conducting the study by relevant ethical guidelines and regulations.

### Code of Ethics

IR.JMU.REC.1401.046

### Author's Contribution

All authors (R. F., A. J., and S. D) had an equal contribution and were involved in all aspects of

study conception and design, data collection, data analysis, interpretation, drafting of the manuscript, and critically revising the manuscript for intellectually important content. All the authors have read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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