

Knowledge and Practice Assessment of Workers in a Pharmaceutical Company about Prevention of Coronary Artery Disease

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Abstract- Coronary artery disease is one of the most common reasons of death around the world. Also, according to previous studies, the incidence of coronary artery disease is rapidly increasing in developing countries such as Iran. The aim of this study was to evaluate the knowledge and practice of pharmaceutical company workers towards the prevention of cardiovascular disease. In this cross sectional study that was conducted in Tehran, 1223 workers of a pharmaceutical company were enrolled. Data was collected using a questionnaire that assessed the level of knowledge and practice of the participants towards coronary artery disease. Regression analysis was used to evaluate the relationship between study variables and the workers knowledge level. The results of this study showed that 49% of the workers were in a good level of knowledge and according to the regression analysis, the female gender, age above 28, education level higher than high school diploma, body mass index above 25 kilograms per square meters, history of hyperlipidemia, history of diabetes, history of hypertension, history of myocardial infarction, daily activity and exercise, were significantly related to a good knowledge towards coronary artery disease. In addition, the mean score of the participants' performance in preventing coronary artery disease was 4.66 out of 9. The results of this study showed that increasing level of knowledge of labors in order to prevent missing specialized work force, leads to imposition of health costs to the industry and the labor society.

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Introduction

Coronary artery disease is one of the main worldwide health risks (1). This disease is one of the leading causes of mortality in the world (2). According to the reports of world health organization in 2005, 41.3 percent of the mortalities in Iran were related to cardiovascular diseases and it is estimated that by the year 2030, this number increases to 44.8 percent (3).

Coronary heart disease can negatively affect the quality of life and financial status of a person (4). In the United States, cardiovascular diseases cost about 300 billion dollars per year (5). The incidence of myocardial infarction is common among the people in working ages (6) and is one of the main reasons of worker disability (5). In the United States, cardiovascular disease is one of the main reasons of disability and early retirement and about 19% of the disability payments are related to this disease (7). It is estimated that about 90 million working

days are wasted due to myocardial infarction (8). Preventing coronary heart disease is important in high-risk societies such as countries located in southern Asia and is effective in decreasing morbidity and mortality of this disease (2,9). According to the studies conducted in southern Asia, the prevalence of hypertension and diabetes among people aged above 45 is 33% and 25%, respectively (10-11). Also, the total prevalence of smoking is 28% in men and 41% in males aged between 40 and 49 (12).

Proper knowledge and practice towards risk factors of coronary artery disease and changing high-risk behaviors and life styles is necessary for preventing coronary artery disease (13). Lack of proper knowledge towards risk factors of coronary artery disease increases the prevalence and mortality of this disease, especially among youth (14). The knowledge and practice towards this disease is different among various populations (14). The results of a study conducted in Pakistan showed that

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the practice and knowledge towards risk factors of heart disease were very low (15). Lip *et al.* conducted a study on women in southern Asia and showed that their knowledge towards some of the risk factors of coronary artery disease including the level of cholesterol were very limited (16).

The results of Rankin's study conducted in southern Asia showed that only few people (20%) recognized inactivity and obesity as risk factors and only 30% were aware of the effects of smoking and high fat nutrition on the incidence of coronary heart disease. Also, the study showed that only 5% recognized family history of coronary artery disease as a risk factor (17). Another study conducted in Pakistan showed limited knowledge towards risk factors of coronary artery disease, especially among women who less than 20% of them were aware of the main risk factors of coronary artery disease (18).

Since workplaces are available gathering areas of people, focusing on the working population gives a good chance to identify and screen the high-risk population, carry out prevention and risk factor controlling programs and educate the work force and even their families (5).

Limited studies have been conducted to evaluate the level of knowledge of Iranian population (especially the work force) towards coronary artery disease prevention. Therefore, we conducted this study to evaluate the knowledge and practice of the working population towards coronary artery disease.

Materials and Methods

This study was conducted to evaluate the knowledge, practice and performance of the labors of a pharmaceutical company in Tehran towards coronary artery disease in 2012. All of the staff who worked in different units of the company were enrolled. An expert using a questionnaire and direct interview with each of the participants collected data. This questionnaire covering different parts and each part included personal, occupational and medical questions. As well as questions related to the knowledge, practice and performance of them towards coronary artery disease risk factors. The personal questions consisted of age, height, weight, gender, marital status, educational level, work history, working shift, history of hypertension, diabetes and hyperlipidemia and history of heart diseases such as myocardial infarction. The knowledge and performance part of the questionnaire consisted of 13 and 9 questions, respectively, that were related to the

prevention and control of the risk factors of coronary artery disease.

The knowledge questions contained six questions related to the effects of proper diet as a preventive factor for coronary artery disease and the effects of an inappropriate diet as a risk factor for coronary artery disease. The effects of high salt diets, sweet foods, high fat food and solid vegetable oil on the disease were the other questions. Three questions were about smoking, inactivity and weight gain as risk factors of coronary artery disease and four other questions were related to the importance of diabetes, hyperlipidemia, hypertension and family history of coronary artery disease, as risk factors.

The performance questions included: three questions about their diet status which asked about consumption rate of fat, sugar, salt and solid vegetable oil. Four other questions were asked about the care that is needed to prevent coronary artery disease. Namely if they test their blood sugar and triglyceride or measure weight and blood pressure. Another two questions were asked about smoking and regular exercise.

The questionnaire was in Persian and its reliability and validity were previously evaluated (19). The Cronbach's alpha was between 78% and 99% for this questionnaire (19).

The given answers to the questions was ranked in the knowledge part (correct answer= 1, incorrect answer =0) and performance questions (good performance =1, poor performance =0). The mean and standard deviation of these two parts were calculated. Participants who correctly answered to three quarters of the knowledge questions (ten correct answers or more) were considered to have a good knowledge (14).

At the end, in order to evaluate the correlation between health level and the participant's knowledge, and to find the main risk factors of heart diseases, all the participants underwent laboratory tests in fasting condition between 7 am to 8 am. These tests included fasting blood sugar and lipid profile (cholesterol, triglyceride, HDL and LDL). Their blood pressures were also measured and recorded 1 hour after blood sampling and 5 min rest.

Data was described by descriptive statistics such as percent and frequency and analyzed by t-test, Chi-square test and regression analysis. The confidence interval was 95 percent and a *P*-value lower than 0.05 was considered as significant. All of the calculations mentioned above were computed by SPSS 11 software. We used logistic regression analysis for assesment of pure impacts of study variables on knowledge and

practice level of participants. We transformed knowledge scores into the categorical variables due including them into the logistic regression. According that we considered knowledge scores more than 10 as good knowledge score.

Results

All of the 1501 workers of the pharmaceutical company were interviewed and 1223 of them accepted to participate in the study (response rate= 81%). Most of the participants were male (88.4%) and married (70.2%) and education level of most of them was above high school diploma. The mean age of the participants was 29.33 years (21 to 57 years), the mean work experience was 4.71 years (0.5 to 32 years) and the mean body mass index was 24.47 kilograms per square meter (17.63 to 37.04 kilograms per square meter). The demographic characteristics and clinical status of the participants, which included the history of heart disease and presence of coronary artery disease risk factors, are shown in Table 1.

The mean score of the knowledge part that was consisted of questions concerning risk factors and effective things in preventing coronary artery disease was 9.87 out of 13 in the studied population. The minimum and maximum score were one and 13, respectively and the standard deviation was 2.32. As mentioned previously, a participant who had a score of ten or above had a good knowledge. According to this,

49% of the participants had a good level of knowledge. About 61% of the participants did not consider a family history of myocardial infarction as a risk factor for coronary artery disease and about 10% of them did not recognize smoking as a risk factor for coronary artery disease. About 41% of the participants did not think that activity and regular exercise could prevent coronary artery disease. About 68% did not recognize high fat diet as a risk factor for coronary artery disease. This number was 50% for high cholesterol level, 54% for high blood sugar and 58% for hypertension.

The mean score of the performance part of the questionnaire was 4.66 out of 9. The minimum and maximum number was 0 and 9, respectively and the standard deviation was 1.69. More than 80% of the participants did not check their cholesterol level, blood sugar and blood pressure regularly and 20% had high fat diets and consumed solid oils. Also, 10.9% were smoking and 39.5% of the participants had regular exercise and activity. Knowledge and performance mean scores correlated significantly ($P=0.001$, $r=0.331$).

The mean score of knowledge was significantly higher in participants with personal or family history of myocardial infarction, history of diabetes, hypertension or hyperlipidemia ($P<0.05$) (Table 2). Also, the mean score of knowledge was higher in women, participants aged above 28 or with body mass index of 25 kilograms per square meter or higher educational level ($P<0.05$) (Table 2).

Table 1. Demographic and coronary artery disease (CAD) risk factors in our study participants (n=1223).

Variable		Number (out of 1223)	Percent (%)
Sex	Male	1081	88.4%
	Female	142	11.6%
Marital Status	Single	365	29.8%
	Married	858	70.2%
Education	Primary	15	1.2%
	High school	114	9.3%
	Diploma	881	72.1%
	Higher than diploma	213	17.4%
BMI > 25 Kg/m ²		588	48.1%
Inactivity		734	60.0%
Shift Worker		690	56.4%
Hypertension	Old cases	43	3.5%
	Just discovered	39	3.2%
Diabetes	Old cases	18	1.4%
	Just discovered	121	9.8%
Hyperlipidemia	Old cases	33	2.6%
	Just discovered	110	8.9%
History of Myocardial Infarction		13	1%
Family History of Myocardial Infarction		489	39.9%
Smoking		134	10.9%

Knowledge of pharmaceutical workers and prevention of CAD

Table 2. Comparison mean value of the coronary artery disease (CAD) knowledge scores among our study population.

Variable		Average score	SD	P-value
Sex	Male	9.79	2.37	0.001
	Female	10.50	1.84	
Marital Status	Single	9.76	2.15	0.281
	Married	9.92	2.39	
Age	≤28	9.27	2.25	0.029
	>28	10.01	2.39	
Education	Primary	7.80	0.66	0.010
	High school	9.36	0.22	
	Diploma	9.94	0.07	
	Higher than diploma	10.10	0.15	
BMI (Kg/m ²)	≤25	9.65	2.47	0.010
	>25	10.11	2.13	
History of Diabetes	No	9.86	2.33	0.027
	Yes	10.72	1.48	
History of Hyperlipidemia	No	9.84	2.34	0.010
	Yes	10.90	1.40	
History of Hypertension	No	9.85	2.34	0.031
	Yes	10.62	1.77	
History of Myocardial Infarction	No	7.46	3.33	0.001
	Yes	9.90	2.30	
Family History of Myocardial Infarction	No	9.83	2.33	0.128
	Yes	10.08	1.30	
Smoking	No	9.95	2.31	0.481
	Yes	9.78	2.58	

On the other hand, the average score of knowledge showed no significant relationship with marital status, smoking, working shift or work experience ($P>0.05$). Also, the average score of the participants who were not aware of their diabetes, hyperlipidemia or hypertension

before the study, wasn't significantly higher than the others ($P>0.05$).

Chi-square test was used to evaluate the relationship between the variables of the study and level of knowledge (Table 3).

Table 3. Crude and adjusted OR of appropriate knowledge of modifiable risk factors for coronary artery disease among subjects.

Variable	Staus	N	Crude OR	95% CI	Adjusted OR	95% CI
Sex	Male	1081	1	---	1	---
	Female	142	1.74	1.22-2.84	1.60	1.10-2.31
Age	≤28	594	1	---	1	---
	>28	629	1.75	1.64-1.83	1.46	1.2-1.86
Education	Primary	129	1	---	1	---
	High school	1094	2.92	1.92-4.46	3.08	1.99-4.75
BMI (Kg/m ²)	≤25	635	1	---	1	---
	>25	588	1.32	1.05-1.65	1.27	1.01-1.62
History of Diabetes	No	1205	1	---	1	---
	Yes	18	1.32	1.19-8.91	2.59	1.02-7.81
History of Hyperlipidemia	No	1190	1	---	1	---
	Yes	33	3.15	1.51-7.13	2.37	1.06-5.29
History of Hypertension	No	1180	1	---	1	---
	Yes	43	3.28	1.10-3.88	1.72	1.15-3.33
History of Myocardial Infarction	No	1210	1	---	1	---
	Yes	13	2.07	1.02-20.11	6.26	1.30-13.14
Smoking	No	1089	1	---	1	---
	Yes	134	8.66	0.73-2.70	1.57	0.79-3.11
Physical exercise	No	734	1	---	1	---
	Yes	489	2.23	1.22-5.37	1.86	1.18-4.22

Finally, logistic regression analysis was used to evaluate relationship between level of knowledge and study variables more accurately (Table 3). According to the results of this Table, multivariate and univariate analysis show that gender, age above 28 years, education level higher than high school diploma, body mass index above 25 kilograms per square meter, past history of hyperlipidemia, diabetes, hypertension and myocardial infarction and regular activity and exercise are significantly related to a good knowledge level regarding coronary artery disease ($P < 0.05$). However, we couldn't find any significant relationship between a good knowledge level and smoking or recent diagnosis of hyperlipidemia, diabetes or hypertension ($P > 0.05$).

Discussion

Nowadays, the incidence of coronary artery disease is increasing in different countries due to the changes in life style and increase in life expectancies. It is important to have a good knowledge towards coronary artery disease for primary prevention of the disease. The results of our study showed that the participants had a relatively good knowledge regarding preventive factors and risk factors of coronary artery disease. Most of the employees were aware of the risks of solid oil usage and high fat diets. However, they were less aware of the benefits of activity and exercise in preventing coronary artery disease. In general, the risk factors of coronary artery disease are divided into behavioral (such as high fat diet, smoking and inactivity) and physiologic (such as hypertension, high cholesterol and obesity). In our study, only 40% of the participants recognized regular activity and exercise as preventive factors for myocardial infarction and interestingly, the prevalence of exercise and activity was similar to this percent. This shows a proper correlation between knowledge and performance. Therefore, it can be concluded that increasing the quality and quantity of educations can cause better performance regarding regular activity and exercise. Khan *et al.* conducted a study in Pakistan and showed that 75% of the participants were not aware of the relationship between heart diseases and inactivity (14). Our study showed that participants who had regular exercise were more knowledgeable about the risk factors of coronary artery disease. This was consistent with the results of Fords and colleagues' study (20). This result can be important in designing educational programs. In our study, about 70% and 90% of the labors considered high fat diets and smoking as risk factors of coronary artery disease, respectively.

However, only 50%, 46% and 42% of them considered cholesterol level, blood sugar and hypertension, respectively, as risk factors of coronary artery disease. Potvin *et al.* conducted a study in Canada and showed that most of the studied participants were more aware of the behavioral risk factors than physiologic risk factors. Their study showed that 60%, 52% and 41% considered high fat diets, smoking and inactivity as risk factors for coronary artery disease. However, the awareness about the correlation between coronary artery disease and obesity, high cholesterol or hypertension was 32%, 27% and 22%, respectively (13).

The results of our study showed that women and participants with higher education levels had higher scores in the knowledge part. This result was similar to the report of Sabzevari *et al.* (19). This may be due to lower work hours of women in comparison to men, which gives them more time to use media such as radio, television and magazines and become more aware of this disease. Adili *et al.* found a significant relationship between the level of knowledge and level of education (21).

In our study, participants aged above 28 years were more knowledgeable than the other participants were and this difference was significant. Jafary *et al.* carried out a study in Pakistan and found out a linear and positive relationship between age and level of knowledge. In their study, participants aged 60 years and above had significantly higher scores (15). This may show that schools in Iran do not have effective and appropriate educational programs regarding coronary artery disease and more information are acquired from media and newspapers after graduation. In our study, participants with past history of hyperlipidemia, diabetes and hypertension had higher knowledge scores. However, this was not applicable to those who found out their hyperlipidemia, hypertension or diabetes during the study. The higher knowledge of the first group can be explained with the higher rate of referrals to clinical centers and the educations they were given at medical centers and from physician's advices. Previous study has also shown similar results (22).

The results of our study show that most of the participants (80%) do not regularly check their blood sugar, lipid profile or blood pressure, some of them (20%) use high fat diets and solid oils and about 11% of them smoke. Our study showed that proper knowledge about the role of smoking (90%) in myocardial infarction has significant relationship with performance; therefore, it is suggested to carry out educational programs in order to teach the community about the

disadvantages of smoking. Also, it is necessary to conduct educational programs to teach the society about the advantages of regular evaluation of blood pressure, blood sugar and lipid profile and this educational programs should be conducted in a good level and quality. Our study showed that more than 50% of the participants were aware of the role of cholesterol level in coronary artery disease. However, most of them (80%) never screened their cholesterol levels. Jafary *et al.* showed in their study that 35%, 65.3% and 84.6% of the participants did not screen their blood pressure, blood sugar and cholesterol level, respectively (15).

Our study showed that a proper knowledge towards coronary artery disease is significantly related to gender, age, level of education, body mass index and history of hyperlipidemia, diabetes, hypertension or myocardial infarction ($P<0.05$). However, the level of knowledge was not related to smoking or recent diagnosis of hypertension, diabetes or hyperlipidemia ($P>0.05$). Wong *et al.* showed in their study that the relationships between good level of knowledge and marriage (OR =3.651, $P=0.008$), higher level of education (OR=5.224, $P<0.001$), inactivity and hypercholesterolemia were significant. On the other hand, they failed to find any relationship between level of knowledge and gender, hypertension, smoking and diabetes (23). Jafary *et al.* evaluated the level of knowledge of people towards coronary artery disease in four hospitals of Pakistan. In their study, 20% of the participants could not mention any risk factors of coronary artery disease. Also, 39.1% recognized high fat diet as a risk factor for coronary artery disease. This number was 14.1% for obesity, 31.9% for smoking and 17.4% for inactivity. This study showed a significant correlation between the level of knowledge and age, salary, level of education, family history of coronary artery disease and history of diabetes (15). Khan *et al.* conducted a study on 720 hospitalized patients of a hospital located in Karachi city of Pakistan and found out that only 42% of them had a proper knowledge towards heart diseases (14). Also, 92% of the participants recognized high fat diet, as a risk factor for heart diseases. This number was 83% for smoking, 42% for obesity and 25% for activity and exercise. This study showed that higher education level, more activity, exercise, and smoking were significantly related to a good level of knowledge; however, no relationship was found between knowledge and age, gender or history of hypertension (14).

One of the limitations of this study was the low number of females who participated in this study. Also, since we used a closed end questionnaire, it couldn't

present an accurate estimate about the level of knowledge. On the other hand, this structure helped the participants to remember their information and this may have overestimated. In addition, since this was a cross sectional study, the results cannot prove any causality. In conclusion, it is necessary to teach the labors about coronary artery disease. Also, teaching about behavioral risk factors in details can be helpful. The labor community and their families form a big part of the society, and they can be easily available. Therefore, the policymakers of the ministry of health must schedule educational programs in different levels and teach the labors about preventing coronary artery disease in order to reduce the incidence of coronary artery disease. Also, occupational health team located in workplace environments must plan educational programs and schedule periodic examinations with the aim of preventing coronary artery disease.

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References

1. Lenfant C. Can we prevent cardiovascular diseases in low- and middle-income countries?. *Bull World Health Organ* 2001;79:980-2.
2. Vanheckea T, Millera W, Franklina B, Weberb J, McCullougha P. Awareness, knowledge, and perception of heart disease among adolescents. *European Journal of Cardiovascular Prevention and Rehabilitation* 2006;13:718-23.
3. WHO Global InfoBase Online. Available from:URL:http://www.who.int/ncd_surveillance/infobase/web/InfoBasePolicyMaker/reports/ReporterFullView.aspx?id=5. Accessed July 17, 2007.
4. Bhattacharyya M, Perkins-Porras L, Whitehead D, Steptoe A. Psychological and clinical predictors of return to work after acute coronary syndrome. *European Heart Journal* 2007;28:160-5.
5. Pegus C, Bazzarre T, Brown J, Menzin J. Effect of the heart at work program on awareness of risk factors, self-efficacy, and health behaviors. *J Occup Environ Med* 2002;44:228-36.

6. Moshe S, Levy D, Silver H. Return to work with heart disease. *Harefuah* 2007;146:113-9.
7. American Heart Association. 2001 Heart and Stroke Statistical Update. Dallas, Texas: AHA; 2000.
8. Leal J, Luengo-Fernandez R, Gray A, Petersen S, Rayner M. Economic burden of cardiovascular diseases in the enlarged European Union. *Eur Heart J* 2006;27:1610-9.
9. Farooqi A, Nagra D, Edgar T, Khunti K. Attitudes to lifestyle risk factors coronary heart disease amongst south Asians in Leicester: a focus group study. *Family practice* 2000;17:293-97.
10. Jafar T, Levey A, Jafary F, White F, Gul A, Rahbar M, Khan A, Hattersley A, Schmid C, Chaturvedi N. Ethnic subgroup differences in hypertension in Pakistan. *J Hypertens* 2003; 21:905-12.
11. Jafar T, Jafary F, Chaturvedi N. Heart disease epidemic in Pakistan: Women and men at equal risk. *Am Heart J* 2005;150:221-6.
12. Ahmad K, Jafary F, Jehan I, Hatcher J, Qayum A, Chaturvedi N, Jafar T. Prevalence and predictors of smoking in Pakistan: Results of the National Health Survey of Pakistan. *Eur J Cardiovasc Prev Rehabil* 2005;12:203-8.
13. Potvin L, Richard L, Edwards A. Knowledge of cardiovascular disease risk factors among the Canadian population: relationships with indicators of socioeconomic status. *CMAJ* 2000; 162(9 Suppl):S5-11.
14. Khan M, Jafary F, Jafar T, Faruqi A, Rasool S, Hatcher J, Chaturvedi N. Knowledge of modifiable risk factors of heart disease among patients with acute myocardial infarction in Karachi, Pakistan: a cross sectional study. *BMC Cardiovascular Disorders* 2006; 6:18.
15. Jafary F, Aslam F, Mahmud H, Waheed A, Shakir M, Afzal A, Qayyum M, Akram J, Khan I, Haque I. Cardiovascular health knowledge and behavior in patient attendants at four tertiary care hospitals in Pakistan – a cause for concern. *BMC Public Health* 2005;5:124.
16. Lip G, Luscombe C, McCarray M, Malik I, Beevers G. Ethnic differences in public health awareness, health perceptions and physical exercise: implications for heart disease prevention. *Ethn Health* 1996;1:47-53.
17. Rankin J, Bhopal R. Understanding of heart disease and diabetes in a South Asian community: cross-sectional study testing the 'snowball' sample method. *Public Health* 2001;115:253-60.
18. Dodani S, Mistry R, Farooqi M, Khwaja A, Qureshi R, Kazmi K. Prevalence and awareness of risk factors and behaviours of coronary heart disease in an urban population of Karachi, the largest city of Pakistan: a community survey. *J Public Health* 2004; 26:245-9.
19. Sabzevari S, Mohammadalizade S, Borhani P. Pishcar Mofrad Z. Kerman populations Knowledge, attitude and practice about prevention of myocardial infarction. *Journal of Rafsanjan University of Medical Sciences* 2002; 4: 275-84. (Persian)
20. Ford E, Jones D. Cardiovascular health knowledge in the United States: findings from the National Health Interview Survey, 1985. *Prev Med* 1991;20:725-36.
21. Adili F, Fakhrzadeh H, Nouri M, Makarem J, Larijani B. Knowledge, practice status and trends in risk factors for cardiovascular disease in inhabitants of tehran university of medical sciences. *Iranian Journal of Diabetes and Lipid Disorders* 2005;5:175-85. (Persian)
22. Schneider A, Pancioli A, Khoury J, Rademacher E, Tuchfarber A, Miller R, Woo D, Kissela B, Broderick J. Trends in community knowledge of the warning signs and risk factors for stroke. *JAMA* 2003;289:343-6.
23. Wong B, Garcia Y, Barr A, Glazier R, Abramson B. Cardiovascular risk factor awareness in a disadvantaged inner-city population implications for preventive strategies. *Can J Cardiol* 2008; 24 : 677-82.