

Lifestyle and the Most Important Risk Factors of Cardiovascular Disease in Physicians, Nurses, and Faculty Members

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Background: Health and treatment groups have the chief responsibility for controlling the risk factors of cardiovascular disease (CVD) and encouraging appropriate lifestyle changes that affect the prevention of this disease.

Objectives: We sought to assess the lifestyle of physicians, nurses, and faculty members and to determine the most important risk factors of CVD among them.

Patients and Methods: This cross-sectional study was conducted on the physicians, nurses, and faculty members of Semnan University of Medical Sciences. The risk factors of CVD under consideration included smoking; sporting habits; life- and work-related stress; consumption of fruit, vegetables, fish, meat, and fast food; body mass index; systolic and diastolic blood pressures; control of cholesterol, triglyceride, and blood sugar levels in the preceding two years; history of depression; and family history of CVD.

Results: Totally, 108 subjects who filled in their questionnaires were included in the study. The study population, including 68.5% females, had a mean age of 36.30 ± 8.878 years. Smokers comprised 1.8% of the subjects. Exercise more than twice a week was reported by 19.4%. Correspondingly, severe and moderate life-related and work-related stress was reported by 61.1% and 63.9% of the subjects. Also, 17.6% and 51.9% of the respondents consumed vegetables and fruit, respectively, more than once a day; 5.6% had fish more than once a week; and 69.4% and 4.6% ate meat and fast food, respectively, more than twice a week. The mean body mass index was 24.67 ± 3.77 , and 39.8% of the participants were overweight or fat. A history of CVD was reported in 0.9%, history of hypertension in 2.8%, history of diabetes in 1.9%, and history of depression in 6.5% of the subjects. High triglyceride levels were detected in 7.4%. Additionally, 45% and 53.7% had controlled their cholesterol and triglyceride levels and blood sugar, correspondingly, for the preceding 2 years. A history of CVD was reported in 20.4% of the study population. The emphasis on CVD risk-factor control was lower among the physicians than among the nurses and faculty members.

Conclusions: The findings of the present study indicate the necessity of modifying lifestyle and controlling CVD risk factors to upgrade the programs of the national health system for reducing the incidence of this disease.

Keywords: Lifestyle; Risk Factors; Cardiovascular Diseases; Physicians; Nurses; Faculty Members

1. Background

Cardiovascular disease (CVD), the most important chronic disease and the most common health problem around the globe, constitutes the most common cause of premature death and disability (1) and is responsible for 35% of the death rate in developed countries and 30% of all deaths in the world (2). Projections show that an estimated 23.3 million people will die of CVD in 2030 (3). However, research indicates that 75% of CVD mortality could be decreased with appropriate lifestyle changes; this is a formidable challenge to which various guidelines on CVD prevention seek to rise (4). Indeed, the risk factors of CVD can be adjusted and such modification and control is accompanied by a drop in the rates of CVD-related death and disability (5). The risk factors of CVD begin in individuals at an early age. The prevalence of these risk factors is high in South Asia; therefore, the sheer size of the population in this geographical area requires in-

creased awareness of risk factors and ways and means to control them (6). The most important risk factors proven to play a role in CVD include smoking, high levels of blood lipids, hypertension, stress, diabetes mellitus, malnutrition, and obesity (7, 8). These risk factors account for approximately 80% cases of CVD (4).

Literature review indicates that the routine management of CVD risk factors in usual care is far from satisfactory and countries' national programs for CVD prevention are ineffective in risk-factor control. There is, consequently, an urgent need to introduce an efficient and structured intervention regarding CVD risk factors (9). Preventive intervention is widely recognized as an effective way to reduce the incidence and progression of these risk factors, and guidelines on CVD prevention have defined practical lifestyle changes and therapeutic goals to that end (10). As a factor of great significance, lifestyle

has always been the main focus of attention in health education and promotion (11). In addition, it is believed that the relationship between CVD and its risk factors depends on race and geographical region, which underscores the need for an investigation into these factors in Iran (12).

In individuals with no symptoms, an assessment of CVD risk factors constitutes the most common way to estimate the risk of the development of this disease in the next 10 years (13). The progress of some CVD risk factors in a group of individuals with health-related university education can determine the real impact of health education as a measure of health promotion (14). The members of health and treatment groups with an appropriate knowledge on CVD risk factors, including physicians, nurses, and faculty members, play a crucial role in controlling the risk factors of CVD inasmuch as their lifestyle can influence, directly or indirectly, the other members of the society (15). However, given the nature of their job, this group of health care professionals is among the most vulnerable people to CVD (12). Also, the progression of some CVD risk factors is known to vary among different groups of health professionals (14). The increasing trend in the incidence of the majority of CVD risk factors hints at a marked gap between awareness of these factors and actual adoption of preventive measures. What renders the need for such research more pronounced is the current dearth of data on CVD risk factors among health care professionals (12).

2. Objectives

The aim of this study was to assess the lifestyle of physicians, nurses, and faculty members and to determine the most important risk factors of CVD among them.

3. Patients and Methods

This cross-sectional study with a descriptive-analytical design was carried out in 2012. The study population was comprised of all the eligible physicians, faculty members, and nurses of Semnan University of Medical Sciences. The samples were randomly selected. The recruited individuals provided consent for participation in the study, and those who did not agree to participate in the study were excluded. Data collection was done using a self-report questionnaire. The prevalence of heart disease was ascertained from self-reported data (16). This assumption was based on the fact that this was a population with formal training in health and, as such, possessing an in-depth knowledge of the risks associated with CVD (14). The correlation between the values obtained by this method of data collection is desirable; accordingly, this method does not interfere with data analysis.

The participants received a questionnaire divided into two parts on demographic information (e.g. age, gender, educational level, job, marital status, job record, and work shift) and on such information as lifestyle and CVD risk-factor control. The risk factors of CVD examined included

those concerning lifestyle (e.g. smoking; sporting habits; life- and work-related stress; and consumption of fruit, vegetables, fish, meat, and fast food) using a Likert scale, ranging from "very low" to "very high", biological factors (e.g. body mass index, systolic and diastolic blood pressures, history of CVD, hypertension, diabetes mellitus, hyperlipidemia, and depression), metabolic factors (e.g. control of cholesterol, low-density lipids [LDL], high-density lipids [HDL], triglyceride, and blood sugar in the preceding 2 years), and family history of CVD. These variables were all assessed by referring to the workplace of the physicians, nurses, and faculty members recruited in the study and asking them to fill in the questionnaire. The validity of the tools was assessed by content through studying authoritative books and journals and seeking guidance from experts. It is worth noting that further data on the progression of CVD risk factors in individuals with university training in health care areas, such as those presented in this study, would allow for the validation of our findings. The reliability of the tools was assessed through retesting and determining a correlation coefficient of 0.81. The body mass index (BMI) was the measure of body fat based on height and weight. According to a study conducted by Adami and Cordera (2003), the BMI is compatible with the Mediterranean as well as Iranian diet and lifestyle. Overweight was defined as a BMI of 25-29.9 kg/m² and obesity as a BMI > 30 kg/m². Natural blood sugar < 120 mg/dL, cholesterol and triglyceride ≥ 200 mg/dL, HDL < 40 mg/dL, LDL ≥ 160 mg/dL, and systolic blood pressure > 140 mmHg or diastolic blood pressure > 90 mmHg or both were taken into account (17). Upon collection, the data were analyzed using SPSS 18. The individual characteristics and lifestyle behaviors were reported on an absolute and relative basis. Significant differences and relationships were investigated using the chi-square test, t-test, correlation test, one-way analysis of variance, and Kruskal-Wallis test. P values < 0.05 were considered significant.

The present study was granted Code of Ethics # 91.204525 by the Ethics Committee of Semnan University of Medical Sciences on August 6, 2012. All the participants in the study provided informed consent on the understanding that they were free to withdraw at any point in the study and were given reassurances as regards the confidentiality of their identity and data. The final results of the study were available to the participants upon request.

4. Results

All the questionnaires were returned, and a total of 108 subjects were included in the study. The study population comprised 19 (17.6%) physicians, 56 (51.9%) nurses, and 33 (30.5%) faculty members. There were 74 (68.5%) women at a mean age of 34.82 years, and the mean age of the male participants was 39.5 years, which was significantly higher than that of the females (P = 0.01). The mean age and job record of the faculty members were higher than those of the physicians and nurses (P = 0.000) (Table 1).

With respect to the workplace, 19.6% of the nurses worked in the general Intensive Care Unit, 12.5% in the surgery emergency ward, 8.9% in the Coronary Care Unit, 7% in the internal emergency ward, and the other 52% in the internal, surgical, and psychiatric wards. Sixteen percent of the nurses were on routine shifts (morning and evening) and 84% on varied shifts, whereas 32% of the physicians were on routine shifts (morning and evening) and 68% on varied shifts.

Smoking was reported in 1.8% of the subjects: one of them smoked between one and 10 cigarettes a day and the other one in excess of 10 cigarettes a day. Also, 5.6% of the respondents had a past history of smoking. The number of the physicians who smoked was significantly higher than that of the nurses ($P = 0.03$), but the difference between the physicians and faculty members was not significant ($P = 0.75$). The number of the men smoking cigarettes was more than the women with the same habit ($P = 0.000$).

For sporting habits, 65% of the samples exercised occasionally, rarely, and or did not exercise at all. There were no significant differences between the sporting habits of the physicians, nurses, and faculty members, but the

faculty members exercised the most and the physicians exercised the least ($P = 0.73$). Ten percent of the samples under survey never exercised, and 37% exercised once to 5 times a week or more. The men exercised significantly more than their female counterparts ($P = 0.03$) (Table 2).

Life- and work-related stress in all the three groups was considerably high. Only 10.2% of the samples reported no life-related stress and 6.5% no work-related stress. Sixty-five percent of the samples had moderate and severe life-related stress and 67% had moderate and severe work-related stress. The male physicians (75%) and female faculty members (64.7%) had the most moderate and severe life-related stress, while the male physicians (91%) and female nurses (63%) had the most moderate and severe work-related stress (Tables 3 and 4). Although life- and work-related stress was higher in the physicians than in the nurses and faculty members, this difference did not constitute statistical significance ($P = 0.36$ and $P = 0.06$). The nurses had the lowest life-related stress and the faculty members the lowest work-related stress. Interestingly, life-related stress had a direct relationship with work-related stress ($P = 0.000$).

Table 1. Frequency/ Number/ Percentage and Mean \pm SD of Age and Work Experience of the Physicians, Nurses, and Faculty Members

Job	Frequency/Percentage of Total	Mean \pm SD of Age	Mean \pm SD of Work Experience
Physician			
Male	12 (11.1)	34.67 \pm 4.73	8.09 \pm 4.18
Female	7 (6.5)	32 \pm 4.69	6.25 \pm 2.22
Nurse			
Male	6 (5.6)	36.5 \pm 10.33	15 \pm 11.81
Female	50 (46.3)	32.14 \pm 8.11	8.7 \pm 8.10
Faculty member			
Male	16 (14.8)	44.25 \pm 6.21	15.5 \pm 6.81
Female	17 (15.7)	43.88 \pm 6.63	16.76 \pm 7.04

Table 2. Frequency/Percentage of the Total Exercise Habits of the Physicians, Nurses, and Faculty Members ^a

Job	Exercise Habits					
	I do Not Exercise	Rarely	Sometimes	1-2 Times a Week	3-4 Times a Week	5 or More Times
Physician						
Male	0 (0)	4 (33.33)	4 (33.33)	2 (16.67)	2 (16.67)	0 (0)
Female	1 (14.29)	2 (28.57)	2 (28.57)	2 (28.57)	0 (0)	0 (0)
Nurse^b						
Male	0 (0)	2 (33.33)	1 (16.67)	0 (0)	1 (16.67)	2 (33.33)
Female	5 (10.20)	15 (30.61)	12 (24.49)	11 (22.45)	6 (12.24)	0 (0)
Faculty Member						
Male	0 (0)	5 (31.25)	3 (18.75)	2 (12.5)	2 (12.5)	4 (25)
Female	4 (23.53)	4 (23.53)	3 (17.65)	2 (11.76)	4 (23.53)	0 (0)

^a Data are presented as No. (%).

^b One of the nurses failed to answer the question.

Table 3. Frequency/Percentage of the Total Life-Related Stress of the Physicians, Nurses, and Faculty Members

Job	Life-Related Stress			
	None	Low	Moderate	Severe
Physician				
Male	1 (8.3)	2 (16.7)	6 (50)	3 (25)
Female	0 (0)	3 (42.9)	3 (42.9)	1 (14.3)
Nurse				
Male	1 (16.7)	3 (50)	2 (33.3)	0 (0)
Female	7 (14)	13 (26)	25 (50)	5 (10)
Faculty member				
Male	2 (12.5)	4 (25)	9 (56.3)	1 (6.3)
Female	0 (0)	6 (35.3)	9 (52.9)	2 (11.8)

Table 4. Frequency/Percentage of the Total Work-Related Stress of the Physicians, Nurses, and Faculty Members

Job	Work-Related Stress			
	None	Low	Moderate	Severe
Physician				
Male	0 (0)	1 (8.3)	4 (33.3)	7 (58.3)
Female	0 (0)	3 (42.9)	3 (42.9)	1 (14.3)
Nurse				
Male ^a	1 (16.7)	1 (16.7)	2 (33.3)	1 (16.7)
Female	5 (10)	11 (22)	21 (42)	13 (28)
Faculty member				
Male	1 (6.3)	8 (50)	6 (37.5)	1 (6.3)
Female	0 (0)	7 (41.2)	6 (35.3)	4 (23.5)

^a A male nurse failed to answer the question.

Fifty-five percent of the respondents did not consume vegetables, 11% occasionally ate fruit, and 72% rarely had fish. Also, 17.6% and 51.6% of the samples consumed vegetables and fruit, respectively, more than once a day, and 5.6% consumed fish more than once a week. Additionally, 69.4% and 4.6% consumed meat and fast food, correspondingly, more than twice a week.

The BMI of the studied samples was calculated by using their height and weight. The mean BMI was 24.67. In this regard, 51.9% of the participants had a normal BMI, whereas 32.4% were overweight and 7.4% and 1.9% were fat and thin, respectively (Totally, 6.5% failed to answer this question.) (Table 5). There was no significant difference between the three groups ($P = 0.6$). The BMI in the men was more than that in the women; this difference, however, was not significant ($P = 0.06$). Those with a longer service record had a higher BMI ($P = 0.02$), and 44.44% of the subjects with more than 20 years of service were overweight.

The incidence of diabetes and high blood pressure was 1.9% and 2.8%, respectively. In addition, 7.4% of the respondents had high fat and 6.5% depression. The systolic and diastolic blood pressure of the studied samples

was normal (115/80 mmHg). Of the whole study population, 54.6% reported having had cholesterol control, 45.4% LDL control, 43.5% HDL control, 45.4% triglyceride control, and 53.7% for blood sugar control over the preceding 2 years. Of those who had controlled their cholesterol for the past 2 years, 87.5% had cholesterol, 92.6% triglyceride, and 98.1% natural blood sugar. The frequency of blood lipid control was significantly higher in the nurses than in the physicians and faculty members ($P = 0.03$, $P = 0.004$, and $P = 0.006$). The frequency of blood sugar control was the highest in the nurses and the lowest in the faculty members; this difference, however, was not significant ($P = 0.07$). History of CVD was reported by 0.9% of the subjects, history of hypertension by 2.8%, history of diabetes by 1.9%, hyperlipidemia by 7.4%, and history of depression by 6.5%. A family history of CVD was reported by 26.3% of the physicians, 16.1% of the nurses, and 24.2% of the faculty members. There were no significant relationships between the control of the risk factors in these groups of individuals. In other words, despite the fact that our subjects were more prone to CVD, their lifestyle did not reflect the actual adoption of measures to control its risk factors.

Table 5. Frequency/Percentage of the Total Body Mass Index of the Physicians, Nurses, and Faculty Members

Job	Body Mass Index			
	Thin	Normal	Overweight	Fat
Physician				
Male	0 (0)	5 (41.7)	6 (50)	1 (8.3)
Female	0 (0)	6 (85.7)	1 (14.3)	0 (0)
Nurse				
Male	0 (0)	2 (33.3)	4 (66.7)	0 (0)
Female	2 (2.2)	26 (57.8)	11 (24.4)	6 (13.3)
Faculty member				
Male	0 (0)	6 (40)	9 (60)	0 (0)
Female	0 (0)	11 (68.8)	4 (25)	1 (6.3)

5. Discussion

The lifestyle of the physicians, nurses, and faculty members recruited in the present study did not translate into action for the control of CVD risk factors in as much as the incidence of the risk factors of CVD was high among them. The fact that despite possessing adequate specialized knowledge on CVD risk factors our study population had an undesirable progression of these factors chimes in with the findings of some previous studies. Imanipour et al. (18) also suggested that the behavior and performance of the teachers recruited in their study vis-à-vis CVD prevention was not satisfactory.

Our findings showed that the physicians had more CVD risk factors than the nurses and faculty members. A high number of the physicians, by comparison with the nurses, smoked cigarettes. Furthermore, the physicians exercised the least of all the three study groups and cited higher life and work-related stress than did the nurses and faculty members. In addition, the BMI of the physicians was more than that of the other two groups. Pouraslami et al. (19) (2000) looked into the incidence of CVD risk factors among the employees, students, and faculty members of School of Medicine, Iran University of Medical Sciences and reported the maximum percentage of these risk factors in the group comprised of physicians. It should, therefore, come as little surprise that change in the physicians' attitude toward CVD risk-factor control is deemed one of the necessary challenges for the reduction of the burden of this disease (20).

Some factors widely acknowledged to contribute to CVD include lack of exercise, poor diet, and smoking. Smoking in the current study was considerably low, which is in contrast with the results of some other studies reporting cigarette smoking rates of between 15% and 45% among physicians and faculty members (21, 22). A study by Imanipour et al. (18) on individuals' behavior regarding CVD risk-factor prevention also indicated that 77.7% of the subjects had no history of smoking or even passive smoking. The low rate of cigarette smoking in our study population reflects the decreasing trend in smoking in

the Iranian community at large and is consistent with the findings of some other studies (1, 8, 23). One explanation for the higher rate of smokers among the physicians, in comparison with the nurses, in our study may be the fact that the majority of the latter group was comprised of women.

In the current study, the life- and work-related stress level, sporting habits, cholesterol level, and BMI of the physicians and nurses working on routine and varied shifts did not differ significantly. Itani et al. (24) reported that working in shifts was responsible for a rise of up to 40% in the incidence of CVD among their study population. In our study, 10% of the studied samples never exercised and only 37% exercised between once and 5 times a week or more. Hedaiati et al. (22) stated that 40% to 50% of the physicians in their study did not exercise at all. Available statistics in Iran indicate that approximately 80% of the entire population have no proper physical activity (18).

Our findings are indicative of the poor dietary habits of the physicians, nurses, and faculty members in so far as they consumed little fruit and fish. This poor consumption of fruit, vegetables, and fish, in view of their crucial cardioprotective role, may be considered the most important risk factor of CVD. The results of a study by Imanipour et al. (18) on individuals' behavior regarding CVD risk-factor prevention showed that the teachers performed very poorly when it came to having a healthy and low-risk diet. Some other studies have also reported similar results, indicating the poor consumption of fruit, vegetables, and fish (1, 15) when research shows that about one-third of all CVD is caused by unhealthy nutrition and insufficient consumption of fruit and vegetables (18). Eating fruit and vegetables three times a week is believed to reduce the risk of CVD (25) and eating fish twice a week is known to play a crucial role in protecting the heart (26). The type of nutrition can have a direct contribution to the incidence of diabetes, hypertension, hyperlipidemia, and obesity (27). A large body of evidence suggests that unhealthy diet and sedentarism have negative effects on

such CVD risk factors as high blood pressure, elevated glucose and lipid levels, excessive weight gain, and obesity (4). In the current study, 39.8% of the samples were overweight or fat. The BMI of the physicians was more than that of the other two groups. In two studies conducted on physicians, between 35% and 72% of these practitioners were overweight and between 12% and 14.2% fat (21). Elsewhere, in other study, the BMI of the faculty members was about overweight (22). Obesity, a CVD risk factor that can be concretely addressed via modifications in lifestyle, is an imbalance between high calorie intake and insufficient physical activity (28). The prevalence of obesity and overweight in the Persian Gulf states, especially in Iran, is on the increase (29). Indeed, obesity and diabetes are proven to be the CVD risk factors with the highest prevalence (1, 30). Inadequate physical activities and poor nutrition habits, as the chief culprits for obesity, were observed among the participants in the current study (31). According to our findings, those who were older were more likely to be overweight and fat. Owing to the nature of their jobs, physicians, nurses, and faculty members are susceptible to obesity and diabetes. Our results demonstrated that 44.44% of those with more than 20 years of service were overweight; accordingly, this sector of society should be accorded pride of place in executive plans for reducing CVD risk factors (32). Also, reports that type 2 diabetes affects South Asians a decade earlier necessitates that due attention be paid to effective national diabetes control programs in each South Asian country (33).

The hypertension rate in the present study was 1.9%. Hypertensives, aside from their susceptibility to CVD, are prone to renal disease and diabetes mellitus. Hypertension doubles the possibility of the incidence of CVD and renders the sufferers more vulnerable to overweight and obesity (32). In 2002, the World Health Organization identified hypertension as the leading risk factor of death, forecasting an epidemic of hypertension and advising community programmers to prevent CVD as a priority (34). Both the incidence and the prevalence of hypertension increase with age, and the lifetime residual risk of developing hypertension for a middle-aged person with a normal blood pressure is 90% (35). A study demonstrated an increase in excessive weight gain, hypertension, and dyslipidemia among physicians and dentists; an increase in excessive weight gain and hypertension but a reduction in sedentarism among pharmacists; an increase in excessive weight gain and alcohol consumption among nurses; and an increase only in dyslipidemia among nutritionists. The analysis of these compiled data, considering only the number of CVD risk factors with a positive or negative variation over a 20-year period, showed a higher progression rate of CVD risk factors among the physicians and dentists and a lower progression rate of CVD risk factors among the nutritionists (14).

Another study indicated that dyslipidemia was emerging as major public health challenge in South Asian countries and that it is primarily driven by nutrition, lifestyle

and demographic transitions, increasingly faulty diets, and physical inactivity, in a background of genetic predisposition. The authors called for the implementation of intervention programs with emphasis on improving knowledge, attitude, and practices regarding healthy nutrition, physical activity, and stress management (36). Previous studies have demonstrated very high prevalence rates of hypercholesterolemia among American men (54.9%) and Puerto Rican women (41.0%) (16). The findings of studies with specific groups of health professionals such as the Nurses' Health Study II (37) and the Physicians' Health Study (38) showed that the prevalence of CVD risk factors was statistically significantly lower among these professionals than in the general population (39-41).

The results of another study suggested that most individuals, albeit in need of food and lifestyle modifications owing to lifestyle-related diseases, failed to take proper action (42). Overall, evidence suggests widespread poor performance in regard to the prevention of CVD risk factors. It has been posited that improper methods for altering the risk factors of CVD require self-improvement (43). The role that physicians and nurses play in the prevention and management of chronic diseases cannot be overstated. Be that as it may, it seems that physicians themselves are incognizant of their effectiveness in assisting patients in CVD prevention, which makes it vitally important that educational interventions be devised for physicians with a view to improving the quality of preventive care in connection with CVD (44, 45). Nurses, another significant component of health care teams, can make major contributions to CVD prevention (44, 45), but their endeavors to effect necessary modifications in the society's lifestyle are hampered by formidable obstacles (46). It seems that quantitative and qualitative research is needed to analyze the roles and responsibilities of health care professionals and determine the reasons for their unwillingness to control CVD risk factors (47). Specifically in the context of South Asia, further research on pathophysiology, guidelines for cut-offs, and culturally-specific lifestyle management of obesity, dyslipidemia, and the metabolic syndrome is required (36).

First and foremost among the limitations of the present study was its use of self-report measures. Also, the underpowered sample size, not least because of the low number of the physicians recruited, is another drawback of note.

In the current study, the prevalence of the risk factors of CVD was high in the physicians, faculty members, and nurses, who are regarded as the high-risk group for this disease. Our findings should serve as a reminder of the significance of screening and planning for and the management and control of CVD and chronic disease risk factors. We would urge that the authorities of universities, medical councils, and nursing associations take concrete measures aimed at decreasing these factors. Controlling risk factors among the members of health and treatment groups can considerably lessen the burden of CVD at relatively low costs.

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Authors' Contributions

Monir Nobahar: Study conception, data collection and analysis, drafting of the manuscript, and critical revisions for important intellectual content. Mohammad Reza Razavi: Data analysis and administrative/technical/material supports.

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References

- Kones R. Primary prevention of coronary heart disease: integration of new data, evolving views, revised goals, and role of rosuvastatin in management. A comprehensive survey. *Drug Des Devel Ther.* 2011;**5**:325-80.
- Boden WE, O'Rourke RA, Crawford MH, Blaustein AS, Deedwania PC, Zoble RG, et al. Outcomes in patients with acute non-Q-wave myocardial infarction randomly assigned to an invasive as compared with a conservative management strategy. Veterans Affairs Non-Q-Wave Infarction Strategies in Hospital (VANQWISH) Trial Investigators. *N Engl J Med.* 1998;**338**(25):1785-92.
- Mathers CD, Loncar D. Projections of Global Mortality and Burden of Disease from 2002 to 2030. *PLoS Medicine.* 2006;**3**(11):e442.
- Alwan A. *Global status report on noncommunicable diseases 2010.*: World Health Organization; 2011.
- Reiner Z, Sonicki Z, Tedeschi-Reiner E. The perception and knowledge of cardiovascular risk factors among medical students. *Croat Med J.* 2012;**53**(3):278-84.
- Misra A, Khurana L. The metabolic syndrome in South Asians: epidemiology, determinants, and prevention. *Metab Syndr Relat Disord.* 2009;**7**(6):497-514.
- Reiner Z, Sonicki Z, Tedeschi-Reiner E. Physicians' perception, knowledge and awareness of cardiovascular risk factors and adherence to prevention guidelines: the PERCRO-DOC survey. *Atheroscler.* 2010;**213**(2):598-603.
- Ribeiro AI, Lopes C, Barros H, de Pina Mde F. After a quarter of century, reduction in coronary heart disease mortality bypassed young adult males in Portugal. *Int J Cardiol.* 2011;**152**(2):279-81.
- Pajak A, Szafraniec K, Janion M, Szpak A, Wizner B, Wolfshaut-Wolak R, et al. The impact of the Polish national Programme of Cardiovascular Disease Prevention on the quality of primary cardiovascular disease prevention in clinical practice. *Kardiologia Pol.* 2010;**68**(12):1332-40.
- Wood DA, Kotseva K, Connolly S, Jennings C, Mead A, Jones J, et al. Nurse-coordinated multidisciplinary, family-based cardiovascular disease prevention programme (EUROACTION) for patients with coronary heart disease and asymptomatic individuals at high risk of cardiovascular disease: a paired, cluster-randomised controlled trial. *Lancet.* 2008;**371**(9629):1999-2012.
- Lear SA, Ignaszewski A, Linden W, Brozic A, Kiess M, Spinelli JJ, et al. The Extensive Lifestyle Management Intervention (ELMI) following cardiac rehabilitation trial. *Eur Heart J.* 2003;**24**(21):1920-7.
- Rasouli M, Mohseni Kiasari A, Mokhberi V, Bagheri B, Danesh Pour N, Shariati R. Global risk assessment of coronary heart disease using framingham's scores for major risk factors. *J Mazandaran Univ Med Sci.* 2006;**16**(50):49-62.
- Boo S, Waters CM, Froelicher ES. Coronary heart disease risk estimation in asymptomatic adults. *Nurs Res.* 2012;**61**(1):66-9.
- Jardim TV, Sousa AL, Povoia TR, Barroso WS, Chinem B, Jardim PC. Comparison of cardiovascular risk factors in different areas of health care over a 20-year period. *Arq Bras Cardiol.* 2014;**103**(6):493-501.
- Fair JM, Gulanick M, Braun LT. Cardiovascular risk factors and lifestyle habits among preventive cardiovascular nurses. *J Cardiovasc Nurs.* 2009;**24**(4):277-86.
- Daviglus ML, Talavera GA, Aviles-Santa ML, Allison M, Cai J, Criqui MH, et al. Prevalence of major cardiovascular risk factors and cardiovascular diseases among Hispanic/Latino individuals of diverse backgrounds in the United States. *JAMA.* 2012;**308**(17):1775-84.
- Adami GF, Cordera R. Association of body mass index, physical activity and eating pattern in adult men. *Nutr Res.* 2003;**23**(5):579-83.
- Imanipour M, Bassampour S, Haghani H. Relationship between preventive behaviors and knowledge regarding cardiovascular diseases. *Hayat.* 2009;**14**(2):41-9.
- Poureslami M, Yaghchi Tabriz Z, Sarmast H. The main risk factors for cardiovascular disease among faculties, students and employees of Iran university of medical sciences. *J Shahid Sadoughi Med Sci Health Serv.* 2001;**8**(4 Supplement on Health):22-9.
- Sposito AC, Ramires JA, Jukema JW, Molina JC, da Silva PM, Ghandanfar MM, et al. Physicians' attitudes and adherence to use of risk scores for primary prevention of cardiovascular disease: cross-sectional survey in three world regions. *Curr Med Res Opin.* 2009;**25**(5):1171-8.
- Nakladalova M, Sovova E, Ivanova K, Kaletova M, Lukl J, Fialova J. Risk factors for cardiovascular diseases in physicians. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub.* 2005;**149**(2):293-5.
- Hedaiahi M, Nabaii B. Self Reported Health, Illness and Self Care among the Specialists of the Hospitals of Tehran University of Medical Sciences. *Hakim.* 2010;**13**(3):137-44.
- Ferdinand KC, Ferdinand DP. Cardiovascular disease disparities: Racial/ethnic factors and potential solutions. *Curr Cardiovasc Risk Rep.* 2009;**3**(3):187-93.
- Itani O, Kaneita Y, Ikeda M, Kondo S, Murata A, Ohida T. Associations of work hours and actual availability of weekly rest days with cardiovascular risk factors. *J Occup Health.* 2013;**55**(1):11-20.
- Guo J, Li W, Wang Y, Chen T, Teo K, Liu LS, et al. Influence of dietary patterns on the risk of acute myocardial infarction in China population: the INTERHEART China study. *Chin Med J (Engl).* 2013;**126**(3):464-70.
- Chowdhury R, Stevens S, Gorman D, Pan A, Warnakula S, Chowdhury S, et al. Association between fish consumption, long chain omega 3 fatty acids, and risk of cerebrovascular disease: systematic review and meta-analysis. *BMJ.* 2012;**345**:e6698.
- Pekka P, Pirjo P, Ulla U. Influencing public nutrition for non-communicable disease prevention: from community intervention to national programme—experiences from Finland. *Public Health Nutr.* 2002;**5**(1A):245-51.
- Haffner SM. Unmet needs in controlling metabolic disease. *Rev Cardiovasc Med.* 2007;**8** Suppl 4:S17-24.
- Hajian-Tilaki KO, Heidari B. Prevalence of obesity, central obesity and the associated factors in urban population aged 20-70 years, in the north of Iran: a population-based study and regression approach. *Obes Rev.* 2007;**8**(1):3-10.
- Goodpaster BH, Delany JP, Otto AD, Kuller L, Vockley J, South-Paul JE, et al. Effects of diet and physical activity interventions on weight loss and cardiometabolic risk factors in severely obese adults: a randomized trial. *JAMA.* 2010;**304**(16):1795-802.
- Kunz I, Schorr U, Klaus S, Sharma AM. Resting metabolic rate and substrate use in obesity hypertension. *Hypertension.* 2000;**36**(1):26-32.

32. Gupta P, Nagaraju SP, Gupta A, Mandya Chikkalingaiah KB. Prehypertension - time to act. *Saudi J Kidney Dis Transpl.* 2012;**23**(2):223-33.
33. Misra A, Ramchandran A, Jayawardena R, Shrivastava U, Snehalatha C. Diabetes in South Asians. *Diabet Med.* 2014;**31**(10):1153-62.
34. Rodgers A, Vaughan P, Prentice T, Edejer T, Evans D, Lowe J. *The World Health Report 2002: reducing risks, promoting healthy life.* Geneva Switzerland: World Health Organization; 2002.
35. Vasan RS, Beiser A, Seshadri S, Larson MG, Kannel WB, D'Agostino RB, et al. Residual lifetime risk for developing hypertension in middle-aged women and men: The Framingham Heart Study. *JAMA.* 2002;**287**(8):1003-10.
36. Misra A, Shrivastava U. Obesity and Dyslipidemia in South Asians. *Nutrients.* 2013;**5**(7):2708-33.
37. Grontved A, Pan A, Mekary RA, Stampfer M, Willett WC, Manson JE, et al. Muscle-strengthening and conditioning activities and risk of type 2 diabetes: a prospective study in two cohorts of US women. *PLoS Med.* 2014;**11**(1):e1001587.
38. Noordman J, van der Weijden T, van Dulmen S. Communication-related behavior change techniques used in face-to-face lifestyle interventions in primary care: a systematic review of the literature. *Patient Educ Couns.* 2012;**89**(2):227-44.
39. Nwankwo T, Yoon SS, Burt V, Gu Q. Hypertension among adults in the United States: National Health and Nutrition Examination Survey, 2011-2012. *NCHS Data Brief.* 2013(133):1-8.
40. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity among adults: United States, 2011-2012. *NCHS Data Brief.* 2013(131):1-8.
41. Carroll MD, Kit BK, Lacher DA. Total and high-density lipoprotein cholesterol in adults: National Health and Nutrition Examination Survey, 2009-2010.: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics; 2012.
42. Neuhouser ML, Miller DL, Kristal AR, Barnett MJ, Cheskin LJ. Diet and exercise habits of patients with diabetes, dyslipidemia, cardiovascular disease or hypertension. *J Am Coll Nutr.* 2002;**21**(5):394-401.
43. Sol BG, van der Bijl JJ, Banga JD, Visseren FL. Vascular risk management through nurse-led self-management programs. *J Vasc Nurs.* 2005;**23**(1):20-4.
44. Mosca L, Linfante AH, Benjamin EJ, Berra K, Hayes SN, Walsh BW, et al. National study of physician awareness and adherence to cardiovascular disease prevention guidelines. *Circulation.* 2005;**111**(4):499-510.
45. Miller SK, Alpert PT, Cross CL. Overweight and obesity in nurses, advanced practice nurses, and nurse educators. *J Am Acad Nurse Pract.* 2008;**20**(5):259-65.
46. Berra K. Challenges of changing lifestyle to reduce risk for cardiovascular disease. *J Cardiovasc Nurs.* 2010;**25**(3):223-7.
47. Jallinoja P, Absetz P, Kuronen R, Nissinen A, Talja M, Uutela A, et al. The dilemma of patient responsibility for lifestyle change: perceptions among primary care physicians and nurses. *Scand J Prim Health Care.* 2007;**25**(4):244-9.