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University Students Knowledge of Cardiovascular Diseases Risk Factors

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Five hundred students of a Midwestern University (Miami University) were asked questions concerning cardiovascular disease risk factor and their own lifestyle habits. The majority of students did not know the major causes of death or risk factors that are related to cardiovascular disease. Somewhat surprising and disappointingly many student did not know their own family history and personal disease risks.

Key words: Cardiovascular risk factors, education knowledge

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Introduction

Cardiovascular disease (CVD), as its name implies, comprises diseases of the heart and blood vessels. Every 32 seconds an American dies from CVD. CVD causes the death of almost one million people every year. This is approximately equal to the combination of death from all cancer, accident, pneumonia, influenza and AIDS. In 1990 alone the cost of CVD was estimated at 94.5 billion dollars, (Oberman *et al.*, 1994) however, CVD mortality has been decreasing in the United States, Possibly due in part to educational programs about CVD prevention (Gans *et al.*, 1999) .

The pathogenesis of atherosclerosis is a lifelong process and results in large part from effects of major risk factors-blood lipids, blood pressure and smoking and their determinants, including dietary imbalance and physical inactivity (Labarthe, 1999). Certain risk factors for CVD have been well defined and are within the purview of changes for most people. For example the leading actual cause of death in the United States as reported by (McGinnis and Foege, 1993) is tobacco usage (estimated at 400000 death), followed by diet and activity patterns (300000). These CVD risk factors are, for the most part, clearly within the control of the individual. Other CVD risk factors such as high blood pressure, high cholesterol and obesity can also be managed.

In light of the recent evidence that CVD mortality is on the decrease, (Labarthe, 1999; Anonymous, 1997) we decided to survey university student's knowledge or ignorance concerning the risk factors of CVD. In order to change behavior to reduce mortality from CVD, a knowledge an awareness of the factors influencing CVD is essential. We expected that a university student population would have a high level of knowledge concerning these factors.

Materials and Methods

Student at a Midwestern University were randomly selected and a survey/questionnaire was administered. The survey consisted of two parts. Part one was a general personal health questionnaire (Table 1). This part was developed to identify student's knowledge, attitudes, background and risk factors related to cardiovascular disease. Part two was an adaptation of the survey conducted by Krupka and Vener (1991) on 635 college undergraduates attending Michigan State University (Table 2). Both parts 1 and 2 were field tested on ten dietetics student and then distributed in large classes across all disciplines and majors on the university campus.

In the Krupka and Vener study, there were 635 completed forms, with 312 men and 341 women responding (Krupka, 1991). The Miami University study had 500 students responding 280 women and 220 men. Both surveys were administered in the same way and given out in classrooms. The Krupka and Vener study consisted of students with majors consisting of sciences backgrounds. The Miami University study utilized random majors and disciplines.

Results and Discussion

Cause of death

In the questionnaire, students were asked to name the top three causes of death in the general population. Women perceived the top three causes of death as heart disease (31.5%) and accidents (13.7%). Men perceived that the most deaths were from heart disease (24.4%), cancer (24.4%) and accidents (22.0%). In actuality the top three causes of death are heart disease,

Table 1: Students; knowledge, attitudes, background and risk factors for CVD

Major:

Year in school:

Age:

Gender:

- (1) In order, what do you think are to 3 causes of death?
 - (2) Which of the following characteristics (if any) play a part in cardiovascular (heart) disease? Check all, if any that apply). age, family history, inactivity, race, high blood pressure, obesity, antioxidants, cigarette smoking, diabetes, high cholesterol
 - (3) Out of the above list, what do you think are the 4 primary risk factors of cardiovascular disease CVD?
 - (4) When do you think is the appropriate time to start worrying about or trying to prevent CVD?
 - (5) Are you worried about getting CVD?
 - (6) Do you think you are at risk?
 - (7) Which gender do you think has the higher risk of CVD before age 40?
 - a. female
 - b. male
 - c. same
 - (8) Which gender do you thik has the higher risk of CVD after age 40?
 - a. female
 - b. male
 - c. same
 - (9) What race has the highest risk of CVD?
 - a. Caucasian
 - b. African
 - c. Oriental
 - d. Hispanic
 - e. Same for all races
 - (10) Personality has an effect on CVD risk.
 - a. true
 - b. false
 - (11) Of the following, which best represents your family's cardiac health:
 - a. no family history of heart disease
 - b. one or more close blood relatives have had a heart attack or stroke before age 60
 - c. one or more close blood relatives have had a heart attack or stroke after age 60
 - d. don't know
 - (12) Do you have any known heart problems or have you ever had any? If so, what?
 - (13) How would you describe yourself:
 - a. non-smoker
 - b. occasionally smoke or come in contact with second-hand smoke on a regular basis
 - c. smoke 10 or less cigarettes a day
 - d. smoke one or two packs a day or quit less than one year ago
 - e. smoke more than 2 packs a day
 - (14) Of the following, which best represents your diabetes history:
 - a. no symptoms and negative family history
 - b. positive family history
 - c. impaired glucose tolerance
 - d. dietary control
 - e. oral medication control
 - f. insulin control
-

Table 1: Continue

-
- (15) What type of diabetes has the higher risk of CVD?
- a. type I (insulin dependent)
 - b. type II (non-insulin dependent)
 - c. same risk
 - d. don't know
- (16) What is your blood pressure:
- a. lower than 140/90
 - b. between 140/90 and 160/105
 - c. above 160/105
 - d. don't know
- (17) What is your cholesterol level:
- a. below 180 mg
 - b. 180-225 mg
 - c. 225-275 mg
 - d. over 275 mg
 - e. don't know
- (18) Have you ever heard of HDL and LDL cholesterol?
- (19) Which kind of cholesterol do you think is bad? (Check one). - HDL_ LDL - both
- (20) Do you know what your HDL and LDL levels are? If so, what are they?
- HDL LDL
- (21) How would you describe your diet?
- a. at least one serving of red meat daily, more than 7 eggs a week, use butter, whole milk and cheese daily
 - b. eat red meat 5-6 times a week, eat 4-7 eggs a week, use margarine, low fat dairy products and some cheese
 - c. eat poultry, fish and little or no red meat, 3 or less eggs a week, some margarine, skim milk products
 - d. fat-free diet
- (22) What kinds of fat are related to CVD?
- a. monounsaturated
 - b. polyunsaturated
 - c. saturated
 - d. all of these
 - e. none
- (23) Can you list some examples of food that are high in?
- monounsaturated fat
- polyunsaturated fat
- saturated fat
- (24) How do you categorize yourself. (the ideal weight for men should be 110 pounds plus 5 pounds per inch over 5 feet; for women -- 100 pounds plus 5 pounds per inch over 5 feet).
- a. less than 10 pounds over ideal weight
 - b. 10-25 pounds over ideal weight
 - c. over 25 pounds over ideal weight
 - d. too embarrassed to say just kidding
- (25) Do you know your percent body fat? If so, what is it and how was it measured?
- (26) What is more important?
- a. actual body weight
 - b. percent body fat
-

Table 1: Continue

-
- (27) Describe your aerobic activity (i.e. brisk walking, jogging, cycling, swimming, etc. for more than 15 min).
- less than once a week
 - 1-2 times a week
 - 3-4 times a week
 - greater than 4 times a week
- (28) Describe your stress level:
- no mental-emotional stress
 - mild stress
 - moderate stress
 - frequent high stress
 - constant high stress
-

Table 2: Questions and the Correct Responses to the Cardiovascular Knowledge Test Developed at Michigan State (Krupka and Vener, 1991)

-
- The incidence of emphysema, a lung disease that makes breathing difficult and often leads to death could be reduced significantly if smoking was eliminated: T
 - Reducing blood cholesterol levels usually requires prescription drug therapy. F
 - Arteriosclerosis is a general term used to describe a thickening and hardening of the arteries.
 - Cholesterol is found in which of the following (a-bananas, b-coconuts, c-butter, d-corn oil)? c
 - The most effective dietary way to lower the level of your blood cholesterol is to eat less: saturated fat
 - A product that is labeled "no cholesterol" is a totally safe choice for people with elevated cholesterol levels: F
 - Which is not a cardiovascular risk factor (a-being male, b-being female, c-260, d-300 plus)? a
 - Which is the most desirable blood cholesterol level for adults (a- 180, b-220, c-260, d-300 plus)? a
 - Which causes the most deaths (a-heart attack, b-stroke, c-high blood pressure, d-rheumatic fever)? c
 - Eating less (a-salt, b-oat bran, c-cheese, d-eggs) can sometimes lower high blood pressure: a
 - Which drug (a-penicillin, b-aspirin, c-AZT, d-vitamin C) can reduce the risk of heart attack? b
 - The National Heart, Lung and Blood Institute recommends a daily diet of at least 600 mg of cholesterol: F
 - Typically, blood pressure increases with age: T
 - The major cause of death in the U.S. today is/are (a-cancer, b-cardiovascular disease, c-accident, d-AIDS): b
 - Cholesterol in humans is (a-produced by the liver, b-found in all cells of the body, c-necessary for the production of hormones): a, b and c
 - Which of the following blood pressures is sufficiently high to seek medical help (a-9/60 b-110/70, c-140/90, d-150/80)? c
 - A heart attack occurs when (a-an insufficient amount of blood reaches the heart, b-too much blood reaches the heart, c-electrical messages from the brain cause faster than normal heart beats, d-the outer membrane of the heart becomes inflamed): a
 - A drug used in treating angina pectoris (chest pain) is (a-vitamin K, b-Tylenol, c-calcium supplements, d-nitroglycerin): d
 - People with high blood pressure are usually nervous and tense: F
 - Which contains the least amount of fat (a- ½ c. of shrimp, b- 3 oz. of lean pork, c- 1 c. of whole milk, d-3 oz. of chicken without the skin): a
 - In the U.S., a greater percentage of blacks develop high blood pressure than do whites: T
 - Chest pain caused by angina pectoris occurs when (a-the heart receives more than the usual supply of blood, b-a heart valve malfunctions, c-the heart doesn't receive as much blood as it requires, d-blood pressure is above normal): c
 - Congestive heart failure indicates that the (a-wall of the heart is weakened and has ballooned out, b-heart is unable to pump out all of the blood that returns to it, c-aorta wall has become thick due to deposits of fat and cholesterol, d-fiber of heart muscles cause rapid and uncoordinated contractions): b
-

Table 2: Continue

-
- (24) A relatively high amount of (a-LDL cholesterol, b-HDL cholesterol, c-Triglycerides, d-glucose) in the blood is associated with a decreased risk of heart disease: b
- (25) Aerobic exercise raises (a-blood sugar, b-total cholesterol, c-LDL cholesterol, d-HDL cholesterol): d
- (26) Rheumatic heart disease is caused by (a-streptococcal infection, b-heavy smoking, c-a cholesterol-rich diet, d-a mineral deficient diet): a
- (27) Heart attacks cause approximately (a- 225,000, b-525, 000, c-725, 000, d- 1 million or more) Americans to die each year: c
- (28) Dietary cholesterol is found only in animal foods: T
- (29) Which of the following oils (a-olive, b-corn, c-coconut, d-peanut) would elevate blood cholesterol levels the most?: c
- (30) Which of the following (a- 1 medium egg, b-1/2 c. lobster, c-3 oz. beef liver, d- 3 oz. of lean beef) contains the most cholesterol?): c
- (31) In only (a-90, b-60, c-30, d-10) percent of high blood pressure cases is the cause known: d
- (32) Smokers have (a-2 to 4, b-5 to 7, c- 10 to 12, d- 15 to 20) times greater risk of heart attack than nonsmokers: a
- (33) Heart attack is the leading cause of death among women in the U.S.: T
- (34) How many American (a-20 million, b-35 million, c-50 million, d-65 million) have some form of cardiovascular disease?: d
-

cancer and stroke. Only 6.8% of women and 3.7% of the men thought stroke was one of the three killer situations. Only 16% of the women and 3.5% of the men were able to identify all three correctly.

Contributing factors

In the questions concerning CVD risk factors, diabetes and race were the least known factors. Concerning diabetes only 8.3% of the women and 7.0% of the men could identify it as a causative factor, while 6.9% of the women and 5.1% of the men could identify race as an associating factor.

High cholesterol, high blood pressure, obesity, inactivity and smoking were the most common answers. High blood pressure, high cholesterol, family history and obesity were the most common answers for the four primary risk factors. Women answered correctly more often, but not in statistically significant fashion. Both were about 20% correct.

The percentage of correct responses to the CVD knowledge test is shown in Table 3. The actual answers were high blood pressure, high cholesterol, smoking and inactivity. In this case the 6.9% men answered more often correctly and only 4.0% of the women could answer correctly. Of the primary factors, smoking and inactivity were the least known.

The students responding to the survey overwhelmingly thought that family history had dominant role in CVD risk. There was a lack of realization that all of the primary risk factors are modifiable and for the most part, self-controllable.

Time to start concern

When asked when the appropriate age is to start concern about or trying to prevent CVD, the majority of both genders, (women 52.0 and men 51.8%) though the twenties was the most appropriate answer. Please note that the majority of these individuals are in their late teens and

Table 3: Percentage of Correct Responses to the CVD Knowledge Test

Q*	M Male (N=312)	O Male (N=220)	M Female (N=314)	O Female (N=280)	M Total (N=653)	O Total** (N=500)
(1)	96.7	100	93.8	100	94.9	100
(2)	91	100	95.3	88	93.7	94.4
(3)	88.2	17.9	89.1	28	88.8	22.6
(4)	88.2	78.8	87.1	75	87.5	77.0
(5)	78.8	96.2	81.8	92	80.0	94.1
(6)	79.7	77.8	80.6	64	80.3	71.2
(7)	77.4	53.3	81.2	70	79.7	61.7
(8)	77.4	80.0	77.7	84	77.6	82.0
(9)	69.3	69.2	76.5	88	73.8	78.4
(10)	71.2	48.3	75.4	81.5	73.8	64.3
(11)	73.1	76.9	71.6	73.1	72.2	75.0
(12)	65.1	74.1	67.2	70.8	66.4	72.5
(13)	65.1	92.3	65.1	96.0	65.1	94.1
(14)	61.8	51.7	60.1	45.5	60.8	48.4
(15)	57.1	000	59.2	17.0	58.4	09.7
(16)	55.7	43.5	58.7	40.0	57.7	41.7
(17)	57.5	57.1	54.3	77.8	55.5	67.3
(18)	52.4	28.0	54.3	24.0	53.5	26.0
(19)	42.5	40.7	46.6	29.2	45.0	35.3
(20)	46.2	40.7	40.2	48.0	42.5	44.2
(21)	45.3	53.8	40.8	66.7	42.5	60.0
(22)	40.1	47.8	421.2	60.0	41.4	54.2
(23)	32.5	25.0	29.3	36.0	30.6	30.6
(24)	24.1	45.8	32.6	52.0	29.3	49.0
(25)	23.1	36.0	24.9	60.0	24.2	48.0
(26)	19.8	29.2	26.4	40.0	23.9	34.7
(27)	19.8	26.9	24.6	28.0	22.8	27.5
(28)	19.8	18.5	24.3	40.0	22.6	28.8
(29)	19.8	37.0	22.3	34.5	21.3	35.7
(30)	19.3	33.3	21.4	56.0	20.6	44.2
(31)	15.1	23.1	23.2	21.7	20.1	22.4
(32)	17.9	07.7	10.3	12.0	13.2	09.8
(33)	13.7	29.6	09.7	25.0	11.2	27.5
(34)	16.0	14.8	05.6	12.0	09.6	13.5

*Q refers to the Question on the Questionnaire (See Methods Section) O** refers to Oxford Miami University sample M refers to Michigan State University sample

early twenties. This is seen as soon but not just yet to start CVD precaution strategies. Only 36.0% of the women and 51.8% of the men are concerned about developing CVD. When students were asked if they thought they were at risk, 45.8% of the women and 55.5% of the men answered yes. Approximately, 50% of each believed they were at risk. Overall men tended to be more concerned about CVD.

Risk factors tallied

Risk factors were given one point each (Table 4). When these factors were tallied only 8% of the women had three or more risk factors. However, 56.8% of the men had three or more risk

Table 4: Points of Risk Factors for Cardiovascular Disease

One point was given for each of the following:

- one or more close blood relatives who had a heart attack or stroke before age 60
 - smoking cigarettes daily
 - having diabetes
 - having greater than 140/90 blood pressure
 - having a cholesterol level of over 225
 - eating red meat 5 or more times a week
 - weighing 25 pounds over ideal body weight
 - exercising less than once a week
 - having constant or frequent high stress
- One half point was given for each of the following:
- smoking occasionally
 - coming in contact with second-hand smoke
 - having a positive diabetes family history

factors. One point is automatically given to men, because they are males, so this can skew the statistics. By examining how many men had three or more risk factors, excluding being male, 24.7% had three or more factors. When the primary risk factors were reviewed, 64.0% of the women and 48.3% of the men did not have any, while none of the women and 17.2% of the men had two or more primary risk factors. Only two of the male students had all four of the primary risk factors. In general the male students had much greater risks of CVD than female students. The male students tended to be concerned about CVD, but a larger percent of women (24.0%) to men (14.8) thought birth was the best time to start preventing CVD.

Gender and personal risk factor

Of the personal CVD risk factor questions, more men did not know their family cardiac history (22.2%, compared with women 8.3%); approximately 40% of both sexes did not know their blood pressures and those that did, more men had high blood pressure (22.25%), compared to women (12%); less women know their cholesterol levels (68%, compared to men 51.9%), but neither had a significantly high incidence of high cholesterol.

Most students reported exercising on a regular basis, with 72.0% of the women and 76.6% of the men exercising three or more times a week. 83.3% of the women and 70.4% of the men weighed less than ten pounds over their ideal weight (this is a very high number in relation to the general public, considering approximately 50% of the population is overweight).

The male students reported a higher incidence of eating red meat, 5 or more times a week, (women 8.0 and men 35.7%), smoking daily (women 0 and men 21.4%) and having more stress (women, 12 and men 32.2%). In this young population it was reported that 12% of the women and 14.8% of the men have or have had heart problems, i.e. heart murmurs, mitral valve prolapse, open heart surgery and heart palpitations.

In the general cardiovascular knowledge questions, a large majority of both sexes, (women 88.0, men 74.1%) thought that males are at higher risk of CVD before age 40, the majority of both sexes (women 56.0, men 70.4%) thought males were at the higher risk after age 40, (actually the

genders are at similar risks). Only 36.0% of the women and 18.5% of the men answered correctly to the latter question.

Race risk factors

When asked what race has the highest CVD risk, the majority of women (52.0%) answered with Africans and only 25.9% of men answered the same. The largest percent of men thought that all races had the same risk of CVD (37.0 male, 12% of women). More women 48.0% compared to men, 29.6% knew that Type I diabetes result in a higher CVD risk (40.0% of women and 55.5% of men did not answer). The majority of both sexes (women 60.0, men 62.9%) thought that personality has an effect on CVD risk.

Knowledge of cholesterol as a risk factor

The majority of both sexes (women 68.0 and men 66.7%) had heard of HDL and LDL cholesterol. When asked which is the bad cholesterol, 54.2% of the women and 46.2% of the men answered LDL. Most of the students know that saturated fat was related to cardiovascular disease (women 72.0 and men 59.3%). Most of the students could list examples of saturated fat (animal products), but most could list examples of mono or polyunsaturated fats. Also, 95.0% of both sexes knew that percent body fat is more important than actual body weight. But only 16.0% of the women and 29.6% of the men actually knew their body fat. Women in our study averaged 15% body fat, while men reported 9%. These self-reported body fat percentages by both groups are representative of highly athletic individuals. For this reason, it is doubtful that these percentages reflected the entire student population at Miami University. It seems more fat, or we had a large percentage of athletic individual in our sample.

Summary and Implications

The lack of correct information found in both studies while alarming is not unusual (Hetlench and Holmen, 1994 ; Kirkland *et al.*, 1999). Although the women were slightly ($p < .05$) more aware of the top three causes of death, they were in the minority. Problems concerning CVD and death causation did not appear to be well understood. This becomes even more alarming when studies suggested that individuals who are better educated are more likely to change their lifestyle to alleviate or prevent CVD. Williams *et al.* (1998), Harrell *et al.* (1999), Gram (1995), Balkau and Eschwege (1995) both found similar conditions in the young adults that they studied.

The least known of the primary risk factors were smoking and inactivity. Considering that our sample was drawn from University students, we expected that these individuals would be aware of the leading actual cause of death and its relation of CVD. Also a surprise was that the majority of these students were active on a regular basis but failed to recognize physical activity as a primary risk factor. The fact that these students since these factors are clearly within one's own volition.

Many individuals did not appear to know their family or personal risk factors, nor did they appear to be concerned about these factors at present. Pearson (Pearson, 1991) also found that

family histories and other related risk factors were unknown. The majority of the students did feel that there was need for concern, but the concern should come “later”. There did not appear to be a realization that activities and food consumption patterns were becoming set now and would have and impact later on their health.

Knowledge and awareness are two critical components in the prevention of CVD. It has been demonstrated that CVD begins in childhood Epstein (1999) and Berenson *et al.* (1997) in fact, the earliest type of lesion indicating CVD (fatty streak) is common in infants and young children Napoli *et al.* (1997). But, what do our children know about health and disease? Children in kindergarten typically understand the cause of illness to be something magical and a result of their transgression of the rules. In the fourth grade, children believe all illness to be caused by germs whose very presence is sufficient to make a child sick. Perrin and Gerrity (1981) is this the message we want children to have? It is no wonder how children may grow up not being aware of the factors of CVD.

Based on the responses generated in our survey, there is much work that needs to be done in the area of health promotion and prevention particularly in relation to CVD. We need to educate children, adolescents and adults in order to promote healthy behaviors and to prevent the formation of CVD in the first place. “Continuity of prevention research, policy and practice across periods of life is needed”^{5 [pp574-575]}. This work should help emphasize that there should be stronger initiative plans taken to educate the general public concerning risk factors for cardiovascular disease.

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