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High Framingham risk score decreases quality of life in adults

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ABSTRACT

Cardiovascular disease (CVD) risk factors, such as diabetes, hypertension, hypercholesterolemia, smoking, and obesity tend to occur together in the general population. Increasing prevalence of multiple CVD risk factors has been related to increased risk of death from coronary heart disease and stroke. Studies have suggested that people with several risk factors of CVD may have impaired health-related quality of life. The objective of this study was to assess the association of CVD risk factors with quality of life (QOL) among adults aged 40 to 65 years. A cross-sectional study was conducted involving 220 subjects 40 - 65 years of age at a health center. The CVD risk factors were assessed using the Framingham risk score that is the standard instrument for assessment of the risk of a first cardiac event. The risk factors assessed were age, smoking, blood pressure, total cholesterol and high density lipoprotein cholesterol concentrations. QOL was assessed by means of the WHOQOL-BREF instrument that had been prevalidated. The results of the study showed that 28.2% of subjects were smokers, 56.4% had stage 1 hypertension, 42.8% high total cholesterol and 13.6% low HDL cholesterol. The high risk group amounted to 45.5% and 42.3% constitued an intermediate risk group. High CVD risk scores were significantly associated with a low QOL for all domains (physical, psychological, social and environment) (p=0.000). Preventing or reducing the multiple CVD risk factors to improve QOL is necessary among adults.

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INTRODUCTION

Chronic diseases are considered major threats to the quality of life (QOL). Prevalence rates of most chronic diseases increase with age and a substantial part of the elderly population suffers from more than one chronic disease. Since chronic diseases and conditions are part of the everyday life of a large proportion of the population, it is considered important to do research on their QOL. One of the frequently encountered chronic diseases is cardiovascular disease (CVD). CVD has become the leading cause of morbidity and mortality for men and women, both for developed and developing countries and rates are expected to rise further over the next few decades.[1-3] The prevalence and incidence of cardiovascular disease increases exponentially with age.[4] Despite the fact that over the lifespan, approximately the same proportion of the female population as the male population dies of complications resulting from CVD, it has been traditionally considered as a middle-age disease. The increasing burden of CVD has important economic implications. CVD occurs typically at a younger age in developing as compared to developed countries, with important consequences such as loss of revenue at household level and loss of productivity at macroeconomic level.[5]

In Indonesia, the results of the Basic Health Research Survey *(Riset Kesehatan Dasar)* of the year 2007, showed the prevalence of CVD to be 7.2%.[6] CVD is inseparable from an individual's unhealthy lifestyle in consequence of changes in patterns of living. The Framingham heart study has developed mathematical functions for predicting risk of clinical coronary heart disease (CHD) events, viz. multivariable mathematical functions that assign weights to major CHD risk factors such as sex, age, blood pressure (BP), total cholesterol (TC), low-density lipoprotein cholesterol (LDLC), high-density lipoprotein cholesterol (HDL-C), smoking behavior, and diabetes status.[7] These mathematical functions are known as the Framingham risk score (FRS), on the basis of which the risk of CVD for a given individual may be predicted.

Physical conditions such as high BP or body mass index (BMI) as well as risk behaviors (such as smoking, alcohol drinking and poor nutritional habits) have been recognized as risk factors for cardiovascular diseases. In addition, psychosocial factors have been suggested as risk factors for atherosclerotic disease.[8]

It is known that health is one of the significant factors that influence a person's QOL. Chronic diseases are considered major threats to the QOL of western populations.[9] Prevalence rates of most chronic diseases increase with age and a substantial part of the elderly population suffers from more than one chronic disease.

The goal of a health service is not only viewed from the aspect of an individual's survival rate, but also from his/her QOL. The World Health Organization (WHO) generally evaluates an individual's QOL by means of multi-dimensional parameters, comprising physical, psychological, environmental and social functions, which affect the well being of an individual's life.[10] The WHO has recently developed a generic profile subjective QOL instrument, the WHOQOL-100, and its brief version, the WHOQOL-BREF.[11] This instrument may be used for assessing an individual's quality of life. If an individual has many risk factors for CVD, his/her QOL will decline. In the physical dimension the lowered health status will be clearly seen, the more so if the parameters of lipid and BP levels are at least borderline (threshold).[12] It may be hypothesized that a high FRS may lower an individual's QOL, which naturally has to be proven. The aim of this study was to investigate the associations between the cardiovascular risk factors as measured by FRS and the level of QOL in adult subjects in primary care.

METHODS

Study setting and design

The present study was analytical-observational with cross-sectional approach performed at one of the South Jakarta districts in November 2007.

Subjects of study

The study subjects were patients visiting the district health center selected according to the following inclusion criteria: aged between 40 and 65 years, able to communicate verbally and willing to participate in the study.

Exclusion criteria were past history of stroke and coronary heart disease based on the information provided by their physician. The age range of 45 to 65 years constitutes the reproductive age and is associated with substantially better health-related QOL and less illness in older age.(13)

Demographic variables and history of CVD

The collected variables were age, sex, occupation, and educational attainment. The educational level was categorized as no education, not finishing elementary school, elemenrary school graduate, junior high school graduate, senior high school graduate, college or university graduate. A history of CVD was determined by an affirmative answer to the question, “Has a doctor, nurse, or other health professional ever told you that you had any of the following: (a) a heart attack, also called a myocardial infarction; (b) angina or coronary heart disease; or (c) a stroke?”

Cardiovascular risk factors

The Framingham Risk score (FRS) is the standard instrument used to assess the risk of a first cardiac event and to guide the institution of primary preventive therapy in individuals at risk of CVD.(8,14) On the basis of the FRS, the risk of CVD is categorized as (i) low: score = 0; (ii) intermediate: score = 1-10; (iii) high: score =11-20;and (iv) very high: score ≥ 20. In this study, the CVD risk factors collected comprised total and HDL-C, hypertension and smoking.

Total and HDL-C

After the subjects had fasted overnight, venous blood samples were drawn to measure TC and HDL-C in whole plasma. Hiperlipidemia is the condition of high blood lipid levels. The normal TC concentration is 140-200 mg/dL or less. The normal HDL-C concentration is more than 40 mg/dl. Thus a HDL-C concentration of < 40 mg/dL is a risk factor for CVD. The ratio of TC to HDL-C should be < 4.6 in males and < 4.0 in females. The risk for CHD increases proportionally with TC: HDL-C ratio. According to the FRS, the lipid profile affecting CHD risk comprises total and HDL-C.(7,15) The lipid profiles were determined at the *Pramita Utama* Laboratory.

Systolic and diastolic blood pressure

Single systolic BP measurements were performed with a mercury sphygmomanometer, with the cuff placed on the right brachial artery at the upper arm 2 cm proximal to the cubital fossa in seated non-smoking subjects. BP categories were defined on the basis of the Seventh Report of the Joint National Committee (JNC VII).(16)

Smoking

All participants were interviewed about present and past smoking habits. Current and past smokers of cigarettes and cigars were judged to have a history of smoking.

QOL assessment

QOL was assessed using the Indonesian version of the WHOQOL-BREF questionnaire. This questionnaire is made up of 26 items which assess the following four domains: (i) physical domain, consisting of 7 items, (ii) psychological domain, with 6 items, (iii) social relations comprises 3 items, and (iv) environment, with 8 items. The WHOQOL-BREF also measures 2 facets of general QOL: (i) overall QOL and (ii) general health. Each item is given a score of 1–5, and a higher score indicates a better QOL. Scores for each domain are calculated by multiplying the average score of each facet by 4. A domain is not given a score if ≥ 20% items have been left unanswered by the respondent. The WHOQOL-BREF instrument has been validated and has shown a high validity and reliability for assessment of the QOL of the elderly.(17) Calculations of high and low QOL categories in each domain are based on the highest and lowest scores for the respective domains according to the

Table 1. Classification of blood pressure for adults[16]

BP classification	SBP mmHg	DBP mmHg
Normal	< 120	and < 80
Prehypertension	120-139	or 80-89
Stage 1 hypertension	140-159	or 90-99
Stage 2 hypertension	$\geq$160	or $\geq$100

Note: BP= blood pressure; SBP= systolic blood pressure; DBP= diastolic blood pressure

Table 2. Distribution of cardiovascular risk for all subjects (n=220)

Cardiovascular risk	n (%)
Smoking	62 (28.2)
Systolic blood pressure (mmHg)	
Normal (< 120)	2 (0.9)
Prehypertension (120-139)	94 (42.7)
Stage 1 hypertension (140-159)	124 (56.4)
Stage 2 hypertension (> 160)	0
Total cholesterol (mg/dL)	
Normal (< 200)	63 (28.6)
High normal (200-239)	63 (28.6)
High ($\geq$ 240)	94 (42.8)
HDL cholestrol (mg/dL)	
Low (< 40)	30 (13.6)
Optimal (40-59)	78 (35.5)
High (> 60)	112 (50.9)

responses of the respondents. The highest and lowest scores are totaled and then divided by 2. The value obtained by this division is taken as the cut-off point for separating the group with a high QOL and that with a low QOL.

Data analysis

For every participant, we calculated the FRS using the classic Framingham equation, and participants were assigned to high risk, intermediate risk, and low risk groups. The distributions of several major factors of CVD and the QOL domains were analyzed by means of percentage analysis. The Pearson correlation analysis was used for determining a correlation between CVD risk factors (according to FRS) and QOL. The analyses were done using SPSS for Windows version 15. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 220 study subjects participated in this study with an age range of 40 - 65 years. More than half of the subjects (58.6%) were females, while males accounted for 41.4%, Eighty percent of the subjects had a low educational level (uneducated and not passing elementary school) and 55.9% were housewifes. The distribution of cardiovascular risk is presented in Table 2. Some 28.2% of subjects were smokers, 56.4% had stage 1 hypertension, 42.8% high TC and 13.6% low HDL-C.

Of all of the individual risk factors included in the FRS calculation, approximately 45.5% was in the high risk category, 42.3% was categorized as intermediate risk and 8.6% as low risk (Table 3).

From Table 4, it is apparent that in the physical domain subjects with a good QOL amounted to 40.5%, whereas in the psychological domain good QOL subjects totaled 51.8%. In the social domain good QOL subjects accounted for 55% and in the environmental domain 55.5% of subjects had a good QOL.

Table 3. Cardiovascular risk for all subjects based on Framingham risk score

Cardiovascular risk	n (%)
Low (0)	19 (8.6)
Intermediate (1-10)	93 (42.3)
High (11-20)	100 (45.5)
Very high (> 20)	8 (3.6)

Table 4. Distrbution of each domain of QOL

QOL	n (%)
Physical domain	
Poor (< 24.5)	131 (59.5)
Good (> 24.5)	89 (40.5)
Psychological domain	
Poor (< 18.5)	106 (48.2)
Good (> 18.5)	114 (51.8)
Social domain	
Poor (< 8)	99 (45.0)
Good (> 8)	121 (55.0)
Environmental domain	
Poor (≤ 24.5)	99 (44.5)
Good (> 24.5)	121 (55.5)

The results of the Pearson correlation test demonstrated the presence of a statistically significant inverse correlation between FRS and QOL in the physical (r = -0.491; p = 0.000), psychological (r = -0.52; p = 0.000), social (r = -0.496; p = 0.000), and environmental domains (r = -0.512; p = 0.000) (Table 5). High FRS values indicate a poor QOL in each domain.

DISCUSSION

The present study examined the association between CVD risk and QOL. According to FRS values, 45.5% of subjects in the age range of 40 to 65 years were at high risk of CVD. Subjects with a high FRS had a correspondingly high risk of CVD. FRS is used for predicting the occurrence of CVD after 10 years (10-year risk prediction) in individuals aged 30 to 74 years who have not suffered from CVD. A prospective study in subjects aged >45 years without any complaints of CVD and were followed-up for approximately 8.5 year, indicated that the risk of CHD death or nonfatal MI for participants in the highest FRS group was 4.3 higher that of participants in the lower FRS group (p=0.009).[18] Our study determined that only 8.6% of subjects were at low risk of CVD. Similar results were obtained in a cohort study of subjects in the age range of 36-64 years, indicating that only a small minority of the cohort (<10% of the entire 39522 participants) met the criteria for low risk at the baseline examination in 1967-1973. Of note, participants with 0 risk factors also had better outcomes than those with 1 or more high risk factors.[19] Subjects at high risk of CVD should attempt to reduce their risk factors, as most of them are amenable to modification. Smokers should stop this habit. Our study showed that the prevalence of main risk factors was: 56.4% for stage I hypertension (140-159 mmHg); 42.8% for high TC (≥240 mg/dL); 13.6% for low HDL-C (<40 mg/dL); and 28.2% for smoking. Adding already recognized cardiovascular risk factors in this group may put them in a challenged life situation. They are a vulnerable population subgroup that needs puhlic health attention. The three major coronary risk factors, viz. serum cholesterol, BP, and cigarette smoking, are important because of their high prevalence and impact on risk, and their prevention could have a great influence on longevity, health care costs and QOL. Assessing effects of cardiovascular risk profile, rather than individual risk factors, is also of public health importance.

Table 5. Correlation between Framingham risk score and respective QOL domains

	QOL			
	Physical domain	Psychological domain	Social domain	Environmental domain
Framingham risk score	*r = -0.491 (p = 0.000)	r = -0.542 (p = 0.000)	r = -0.496 (p = 0.000)	r = -0.512 (p = 0.000)

* r = Pearson correlation coeficient

Our study indicates that high CVD risk tend to significantly lower the QOL in subjects aged 40-65 years for all four domains (physical, psychological, social and environmental). Several previous studies obtained results consistent with ours, in that higher CVD risk (a combination of hypertension, hyperlipidemia, and smoking) had an adverse impact on HRQOL.[20-22] The influence of increasing numbers of risk factors, was generally additive. Thus accumulation of more CVD risk factors may be associated with a more substantial impairment of QOL.[23] However, no causality can be drawn from the presented results and therefore prospective studies are needed to allow causal inferences to be drawn.

Actually the three major coronary risk factors (serum cholesterol, BP, and cigarette smoking) are variables amenable to intervention. A study has demonstrated that primary prevention through lifestyle intervention in primary healthcare has favourable effects on several cardiovascular risk factors in moderate to high risk patients, and the improvements can persist for up to one year.[24] Subjects in the high CVD risk group should be motivated to complete such an intervention program.

A weakness of our study would be the limited number of CVD biomarkers selected for investigation. Other biomarkers such as diabetes, low density lipoprotein cholesterol, and obesity should also have been included. A second limitation of our study is that the majority of subjects were female with a low level of education, so that the study results cannot be generalized to populations with differing characteristics.

CONCLUSIONS

A high prevalence of major risks factors was found in our study. The majority of subjects were in the groups of intemediate and high risk CVD, as assessed by the FRS. The data in this study support the hypothesis that an individual with a high risk of CVD at 10-years prediction will experience a lowered QOL. These findings stress the need for affordable, cost-effective treatment strategies and the critical importance of public health strategies aimed at reducing risk factors in the entire population.

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