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Cardiovascular risk factors and quality of life in women who underwent revascularization with coronary stenting

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Acronyms
ACS: acute coronary syndrome
AMI: acute myocardial infarction
CAD: coronary artery disease
CVD: Cardiovascular disease
CVE: cardiovascular events
CVRF: cardiovascular risk factors
PCI: percutaneous coronary intervention
PEQL: Perceived and experienced quality of life

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ABSTRACT

Introduction: Cardiovascular risk factors are directly responsible for the high mortality from atherosclerotic coronary artery disease in women.

Objective: To describe these risk factors, the clinical course and quality of life in women after coronary angioplasty.

Method: A descriptive, longitudinal prospective study was conducted in women (n=62) who underwent revascularization with PTCA and stent implantation from January to June 2011. Clinical follow-up was performed for 180 days through medical consultations.

Results: The mean age was 52.8 years and the most frequent cardiovascular risk factor was hypertension (66.1 %); diabetes (24.2 %) was the least prevalent. One-vessel atherosclerotic coronary artery disease was the most common (87.1%), and three-vessel disease (1.6%) was the least frequent one. Only one stent was implanted in 75.8 % of patients, and only one patient required the implantation of three stents; 83.9% of patients expressed that their quality of life was good, 14.5 % considered it was acceptable and one patient estimated it was poor. During clinical follow-up, no cardiovascular events was reported in 93.5 % of patients. Diabetes and poor quality of life showed a statistically significant association with the extent of atherosclerotic coronary artery disease, the number of stents used and cardiovascular events.

Conclusions: Women with atherosclerotic coronary artery disease who underwent revascularization with coronary stents show a high frequency of risk factors, and have a favorable clinical course with a prevalence of positive perceptions concerning their quality of life.

Key words: Cardiovascular risk factors, Quality of life, Percutaneous coronary intervention

Factores de riesgo cardiovascular y calidad de vida en mujeres revascularizadas con stent coronarios

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RESUMEN

Introducción: Los factores de riesgo cardiovascular son responsables directos de la elevada mortalidad por enfermedad coronaria aterosclerótica en la mujer.

Objetivo: Describir dichos factores, la evolución clínica y la calidad de vida en las féminas tras realizarle angioplastia coronaria.

Método: Estudio descriptivo, longitudinal y prospectivo en 62 mujeres revascularizadas con angioplastia e implante de stent en el período de enero a junio de 2011. Se realizó seguimiento clínico durante 180 días a través de las consultas médicas.

Resultados: La edad media fue de 52,8 años y el factor de riesgo cardiovascular más frecuente, la hipertensión arterial (66,1 %), y la diabetes (24,2 %), el menos prevalente. La enfermedad coronaria aterosclerótica de un vaso fue la de mayor frecuencia (87,1 %) y la de tres vasos (1,6 %), la menos representada. En 75,8 % de los pacientes se utilizó un stent, solo uno requirió de tres. El 83,9 % de ellos valoraron su calidad de vida como buena, 14,5 % la consideraron aceptable y uno la estimó como pobre. En 93,5 % de los pacientes no se evidenciaron acontecimientos cardiovasculares durante el seguimiento clínico. La diabetes y la categoría calidad de vida pobre, mostraron una asociación estadísticamente significativa con la extensión de la enfermedad coronaria aterosclerótica, el número de stents utilizados y los acontecimientos cardiovasculares.

Conclusiones: Las mujeres con enfermedad coronaria aterosclerótica, revascularizadas con stents coronarios, tienen una elevada frecuencia de factores de riesgo, una evolución clínica favorable y un predominio de las percepciones positivas sobre su calidad de vida.

Palabras clave: Factores de riesgo cardiovascular, Calidad de vida, Intervencionismo coronario percutáneo

INTRODUCTION

Cardiovascular disease (CVD) is currently the leading cause of death in industrialized nations; and it is expected to be the same in developing countries by the year 2020[1]. In Cuba, it is the leading cause of death, and by the end of 2011, females accounted for 47.8 % of deaths from this disease[2].

The common anatomical and physiopathologic substrate of CVD is atherosclerosis, a multifactorial process that involves several cardiovascular risk factors (CVRF). The most common CVRF are: hypertension, diabetes mellitus, atherogenic dyslipoproteinemia and smoking. They are present in approximately 90% of patients with atherosclerotic coronary artery disease (CAD)[3].

For this reason, it is a great challenge and a very high responsibility to reach adequate levels of health promotion and control of the CVRF, to reduce the incidence of ischemic heart disease and its consequent morbidity and disability, with decreased quality of life and the loss of valuable social and labor years[4].

The high incidence and prevalence of atherosclerotic CAD have encouraged rapid developments in therapeutic alternatives, including percutaneous coronary intervention (PCI)[5].

The resulting impact of CVD is reflected in different aspects. In the economic field, it requires large expenses, from institutions and patients, due to the high costs of medical care and readmissions that lead to disability and work absenteeism. With regard to the patients' physical condition, they face limitations due to the clinical symptomatology, which leads to a greater perception of disability. From an emotional point of view, they suffer from high levels of anxiety, and even depression. These factors are acknowledged as sources of risk for the development of atherosclerotic CAD, which affects family dynamics and results in household and social conflicts. Atherosclerotic CAD is a public health problem that affects the physical, social and emotional aspects of the patients' quality of life[6].

The influence of objective and subjective factors in determining this quality of life is acknowledged; and it is stated that if both types of factors are improved, then, the quality of life will be higher at both, individual and social level. Self-assessment plays an important role. When assessing this phenomenon and its

implications for the preservation of the quality of life, it is analyzed considering prioritized needs and motives that form the essential meaning of life, with which the subject is emotionally committed, and assessing whether or not there is an impact in the individual quality of life and in the essential aspects of the patient's personality[7].

To our knowledge, for the first time in Cuba and the world, it is conducted a self-assessment study on the quality of life of women under 60 years of age who underwent revascularization with PCI and stent implantation.

The above motivates and justifies the objective of this study, which is simply to describe the CVRF mentioned above, the clinical course and the self-assessment of the quality of life in this group of patients.

METHOD

A descriptive, longitudinal and prospective study was conducted from January to June 2011. From the universe of women who were treated at the Institute of Cardiology and Cardiovascular Surgery, a purposive sample was selected including all those patients treated with PCI who met the inclusion and exclusion criteria (n=62). The information about age, CVRF being studied, extent of the atherosclerotic CAD, number of diseased vessels and stents used was collected during hospitalization. After hospital discharge, a clinical follow-up was conducted for 180 days by scheduled medical consultations (at 30, 90 and 180 days), which identified the presence of cardiovascular events (CVE) and determined the self-assessment of the quality of life through a method that was validated[7] at the consulting room (**Appendix**).

All procedures were performed through vascular access via the femoral artery by Seldinger technique[8] and the angiographic assessment of the coronary artery was conducted by Judkins technique[9], according to the protocol of the hospital.

Inclusion criteria

1. Female patients under 60 years of age with no history of psychiatric disorders, who were admitted to the Institute of Cardiology and Cardiovascular Surgery and underwent complete revascularization with PCI and stent implantation, with a successful outcome.
2. To attend all scheduled consultations after discharge.
3. To voluntarily participate in the study and sign the informed consent form.

Exclusion criteria

Patients with a coronary anatomy that is not suitable for this procedure, at the discretion of the operator, particularly, chronic total occlusions and extensive calcification.

Exit Criteria

Patients who had given their informed consent and decided to revoke it.

Definition of variables

Successful PCI and conventional stenting: When coronary vessel dilation was achieved after stent implantation, with residual stenosis less than 10% and TIMI 3 antegrade flow; without dissection, or thrombus in the target lesion and absence of serious complications such as death, acute myocardial infarction (AMI), or emergent surgical revascularization within 24 hours after PCI.

Complete revascularization: Absence of stenosis greater than 50% in the epicardial coronary arteries or vessels greater than 2 mm in diameter at the end of the PCI.

One, two or three-vessel disease: The nomenclature proposed by Aldeman[10] for the anatomy of the coronary circulation was used, and the extent of atherosclerotic CAD was classified according to the number of coronary vessels with significant stenosis.

Hypertension, diabetes mellitus and atherogenic dyslipoproteinemia: All patients who were previously diagnosed with the disease, with antihypertensive, hypoglycemic or lipid-lowering treatment (as applicable), or who were newly diagnosed during hospitalization or clinical follow-up, according to the criteria proposed by the WHO[3,11,12].

CVE: Cardiac and non-cardiac death, unstable angina according Braunwald criteria[13], non-fatal AMI[14] and the need for a repeat revascularization procedure (angioplasty or surgery).

Perceived and experienced quality of life (PEQL): It is the evaluative expression resulting from the relationship between the actual situation, the aspirations and expectations, considering it within the aspects described by the subject as the essential ones, which are seen as truly important. If the actual situation of the essential aspects is equal or close to the aspirations, or if it is expected to be achieved in the short, medium or long term, then the self-assessment of the quality of life is in a positive range (good and acceptable). If not, it is in a negative range (poor and bad)[7].

In the PEQL assessment form (**Appendix**), each evaluative line is divided into four equal spaces with a score of 4, 3, 2 and 1. The highest score is given to positive answers or that with the highest intensity, according to the question. In item d, the score is reversed. To reach a diagnosis with the general technique, the scores are added up:

- Between 100 and 76: Good PEQL, very positive assessments predominate.
- Between 75 and 51: Acceptable PEQL, positive assessments predominate.
- Between 50 and 26: Poor PEQL, negative assessments predominate.
- Between 25 and 0: Bad PEQL, highly negative assessments predominate.

Information processing

Data were stored and processed with the Statistical Package for Social Sciences, version 8.0 for Windows.

Qualitative variables were expressed as absolute numbers and percentages. The mean and standard deviation were described as summary measures of age. Fisher's exact test was used to determine the relationship between the variables studied. The statistical validation of the results of the study adopted a significance level of less than 5 % for the degrees of freedom previously fixed in each of the circumstances presented. A 95 % confidence interval was set.

Absolute frequency distributions were created and expressed, briefly, by one-input data tables.

Ethics

The study was approved by the Scientific Council of the Institute of Cardiology and Cardiovascular Surgery.

The study was in agreement with the provisions of the basic principles of the Helsinki Declaration containing recommendations to follow in biomedical research involving human subjects, as it was established in the 59th General Assembly of the World Medical Association in Seoul, Korea, in October 2008[15].

RESULTS

The study included 62 female patients who met the inclusion criteria; the mean age was 52.8 ± 6.1 years. None of them withdrew informed consent. There were no losses to follow-up. Hypertension (66.1 %) was the most frequent CVRF, followed by smoking (37.1 %), dyslipoproteinemia (27.4 %) and diabetes (24.2 %) (**Table 1**).

Table 1. Distribution of patients by age and CVRF (n=62).

Characteristics	Nº	%
Mean age ± SD (years)	52,8 ± 6,1	
Hypertension	41	66,1
Diabetes mellitus	15	24,2
Dyslipoproteinemia	17	27,4
Smoking	23	37,1

SD: standard deviation
Source : Data collection form

Table 2. Features of the interventional procedure (n=62)

Características	Nº	%
Atherosclerotic coronary artery disease		
One-vessel disease	54	87,1
Two-vessel disease	7	11,3
Three-vessel disease	1	1,6
Number of stents used		
1	47	75,8
2	14	22,6
3	1	1,6

One-vessel atherosclerotic CAD was the most frequent type (87.1%), while two-vessel disease (11.3%) was the second most prevalent one, and only one patient (1.6 %) showed 3-vessel disease. During PCI,

one stent was implanted in the majority of subjects (75.8 %), 2 stents in 22.6 % of patients and only one patient (1.6 %) needed three stents (**Table 2**).

It turned out that 52 patients (83.9 %) considered that their quality of life was good, in the context of their disease, while 14.5% of patients thought it was acceptable, and one patient (1.6 %) expressed it was poor. No patient regarded it as bad (**Table 3**).

Up to 90 days of follow-up, no patient had CVE. In the period from 91 to 180 days of follow-up, 93.5 % of patients were uneventful, and just 4 patients (6.4 %) had unstable angina (**Table 4**).

It was observed that diabetes mellitus and the poor PEQL category had a statistically significant association with the extent of the atherosclerotic CAD, the number of stents used and the CVE. It was determined that the other CVRF which had a statistically significant association with CVE was dyslipoproteinemia. In the acceptable PEQL category, there was also a statistically significant association with the extent of the atherosclerotic CAD and the number of stents used (**Table 5**).

Table 3. Assessment of the perceived and experienced quality of life

Perceived and experienced quality of life	Nº	%
Good	52	83,9
Acceptable	9	14,5
Poor	1	1,6
Total	62	100

Table 4. Cardiovascular events during clinical follow-up.

CVE	Días					
	0 a 30		31 a 90		91 a 180	
	Nº	%	Nº	%	Nº	%
Uneventful	62	100	62	100	58	93,5
Unstable angina	0	-	0	-	4	6,4
Total	62	100	62	100	62	100

Table 5. Relationship of cardiovascular risk factors and quality of life to atherosclerotic coronary artery disease, number of coronary stents used and CVE.

Características	Valores de p[§]		
	ECA	*Stent*	ACV
Cardiovascular risk factors			
Hypertension	0,49	0,63	0,15
Diabetes mellitus	0,02	0,00	0,00
Dyslipidemia	0,11	0,05	0,01
Smoking	0,07	0.05	0,10
Quality of life			
Good	0,21	0,67	0,37
Acceptable	0,01	0,04	0,54
Poor	0,00	0,00	0,00

§: p-value, test of Fisher and Yates' correction. Confidence interval 95 %.

DISCUSSION

Atherosclerotic CAD is the main cause of death in women and the prevalence of CVRF has a direct responsibility for this situation[16,17]. The mortality rate in females between 35 and 54 years of age is increasing due to the incidence of diabetes mellitus, hypertension, sedentary lifestyle and metabolic syndrome[18].

The mean age of the patients in our study does not coincide with that reported by some authors[19,20]. Concepción and Ramos[21] state that age is in itself an important CVRF, because with aging several anatomical and functional changes occur in the cardiovascular system. In connection with this statement, Andrés *et al*[22] point out that age has a linear relationship with the development of CVD and that older-age patients have a higher mortality because this population has most of the CVRF and coronary complications.

In the FAST-MI study (presented at the 2012 Congress of the European Society of Cardiology), the authors concluded that France had an increase in the percentage of women under 60 years of age with acute ST-segment elevation, and an increased use of reperfusion therapy and medications[23].

Hypertension is one of the most common CVRF in patients with CVD, and in our study it was the predominant (66.1 %). This finding is consistent with those of other authors[24-26]. With regard to hypertension control, there is still debate about the adequate

level of blood pressure in a patient with atherosclerotic CAD. The WHO recommends a systolic blood pressure <140 mmHg and a diastolic blood pressure <90 mmHg, or <130/80 mmHg in the case of patients with diabetes or renal insufficiency[11]. In recent years this concept has been questioned. Boutitie[27], in a meta-analysis of over 40,000 patients, described a decrease in blood pressure beyond certain limits, which increased mortality. These findings were confirmed by Messerli[28] in 2006. Likewise, the INVEST study, with more than 22.00 subjects, showed that the mortality of those with atherosclerotic CAD has a J-shaped curve with respect to blood pressure levels, which demonstrates that hypertension increases the risk of atherosclerotic CAD.

The ACCORD BP study[29] in diabetics did no demonstrate any additional benefit in reducing systolic pressure to 120 mmHg, compared to keeping it at 140 mmHg. Cooper-DeHoff[30], in a group of coronary patients, found that blood levels between 130 and 140 mmHg correlated with immediate and lower mortality. This author showed that hypertension was an independent predictor of mortality in the cases studied. Researchers on this topic found that this premise also applies to atherosclerotic CAD patients after myocardial revascularization surgery, with peripheral arterial disease and over 60 years of age[31-33].

On the other hand, in a study of the PROVE IT-TIMI 22 trial, blood pressure was assessed in patients with acute coronary syndrome and it was confirmed the U-shaped or J-shaped association between blood pressure and CVE[34], with a lower incidence of events for a systolic pressure of 130 to 140 mmHg and a diastolic pressure of 80 to 90 mmHg, and a significant increase in morbidity and mortality with blood pressure levels below 110/70 mmHg.

Dyslipoproteinemia is one of the most important CVRF for the development of atherosclerosis and CVD. In this study, its prevalence was similar to that reported in other studies[35-39]. High levels of total cholesterol, triglycerides and low density lipoproteins (LDL) have a negative impact on health. LDL has a direct impact on atherogenic risk and is an important component of vulnerable or unstable plaques. The reduction of high density lipoproteins (HDL) has also been identified as an atherogenic risk and as a weakening of the protection against the development of CVD in old age, influenced by an imbalance between estrogen and progesterone due to menopause[22]. Splansky[40] and O'Donnell[41] described how hypertriglyceridemia is associated with atherosclerosis, as its increase is a strong CVRF in women compared to men[42, 43].

A recent meta-analysis of 26 trials showed that the greater the reduction of LDL cholesterol, the lower the incidence of myocardial infarction, revascularization and stroke, and highlights the superiority of intensive lipid-lowering regimes for cardiovascular prevention[44].

Another study showed an inverse association between the ability of HDL to accept cholesterol from macrophages and the presence of atherosclerosis, suggesting that the HDL antiatherogenic effect may not depend only on its blood concentration, but also on its functional nature[45].

Smoking, another CVRF studied in our research, is considered an addiction in most patients and its treatment generally requires a multidisciplinary health team. The result obtained in our study is similar to that reported by other authors[38,46,47]. Puymirat *et al*[23], in their investigation which covered the period 1995-2010, reported that in women under 60 years of age the prevalence of active smoking increased from 37.3 to 73.1 %, with the consequent impact on the increased mortality in this group of patients. It is known that smoking cessation is one of the most important interventions for reducing total death, and is more effective than any other intervention to prevent the first acute coronary syndrome (ACS)[48].

In the ASTRAL study (presented at the 57th Annual Scientific Session of the American College of Cardiology), researchers found that 54% of patients with mean stenosis of the renal artery were ex-smokers[49].

Diabetes mellitus is another of the most important CVRF currently described[36]. In our study, the prevalence of this factor coincides with reports in other publications[35,36-39]. Recently, Ray *et al*[50] concluded that the prognosis of the clinical course of non-diabetic patients with atherosclerotic CAD is similar to that described in diabetics without this disease. In addition, this study showed that an aggressive strategy with regard to blood glucose reduces by 17 % nonfatal myocardial infarctions and by 15% atherosclerotic CAD events, without changing the likelihood of stroke and death[50, 51].

The most frequent CVE was unstable angina, a result similar to those observed by Leyva *et al*[20]. The prevalence of one-vessel atherosclerotic CAD and the use of one stent in our study are consistent with reports by other authors[52-54]. In Spain, in 2011, only one

stent was implanted in 89 % of PCI[55]. It has been described that the extension of atherosclerotic CAD is an important indicator of prognosis, quality of life and mortality in patients with ischemic heart disease[56]. In the CASS registry, of patients with drug treatment, survival at 12 years for those with normal coronary arteries was 91%, compared with 74, 59 and 50% for those with one-vessel disease, two-vessel disease and three-vessel disease, respectively[57].

The results of our study in relation to the assessment of the quality of life are similar to those reported by other researchers[6,7,58,59]. These findings demonstrate that the presence of a disease or condition does not preclude the possibility of having a positive view of the personal quality of life. This study suggests that healthy behaviors and the enjoyment of a quality life are possible for ill people, provided that they show adherence to treatment and a healthy lifestyle[7,59].

For a comprehensive treatment of patients with atherosclerotic CAD, it is necessary to consider the psychosocial aspects surrounding it because the psychological reactions that may occur after an ACS are diverse: anxiety, hostility, isolation, sexual dysfunction, fatigue, decreased quality of life, family conflicts, labor conflicts and neglect of treatments. Therefore, it is the task of the health care team to provide containment and support in this regard to patients suffering from an ACS[6,7,58-62].

The knowledge gained and the results of our study suggest that the control and modification of multiple risk factors, especially by interventions designed to reduce the prevalence of hypertension, diabetes mellitus, high cholesterol, smoking and psychosocial aspects, may have a favorable impact in reducing the development of atherosclerotic CAD, in the incidence of CVE and in the quality of life of patients.

Therefore, this study gives new information that can be used to provide a more comprehensive treatment for this group of patients.

CONCLUSIONS

Women with atherosclerotic coronary artery disease, who underwent revascularization with coronary stenting, show a high frequency of risk factors, and have a favorable clinical course and a predominance of positive perceptions about their quality of life.

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Appendix. Rating scale for perceived and experienced quality of life in the context of the disease.
In the following scale, we would like you to reflect the degree of satisfaction you experience in particular aspects of your life. Your evaluative criteria will reflect your current living conditions and how you feel about them, and the scope of your aspirations and the expectations or real hope of reaching what you still want and have not achieved yet.
Tick in the space provided. Remember that these responses are anonymous, you must answer truthfully.
Answer these items in relation to the ischemic heart disease you have and the treatment with stent implantation:

I	II	III	IV	V	VI
a) Suffering from it makes you feel: __ Very bad __ Bad __ So-so __ The same __ (I accept it)	The medical treatment you follow makes you feel: __ Very satisfied __ Satisfied __ Little satisfied __ Dissatisfied	The progress you have had makes you feel: __ Very satisfied __ Satisfied __ Little satisfied __ Dissatisfied	With regard to the diagnostic investigation procedure used, you feel: __ Very bad __ Bad __ So-so __ The same	With the doctor-patient relationship, you feel: __ Very satisfied __ Satisfied __ Little satisfied __ Dissatisfied	With the rehabilitation or recovery, you feel: __ Very satisfied __ Satisfied __ Little satisfied __ Dissatisfied
b) The aspects of your disease you expect to control, you think that have been: __ Achieved __ Almost achieved __ Little achieved __ Not achieved	What you expect to achieve with the medical treatment you follow, you think that has been: __ Achieved __ Almost achieved __ Little achieved __ Not achieved	The progress you expected to achieve with regard to your disease, you think that has been: __ Achieved __ Almost achieved __ Little achieved __ Not achieved	What you expected with regard to determining the diagnosis of your illness, you think that has been: __ Achieved __ Almost achieved __ Little achieved __ Not achieved	What you expected to achieve with regard to the doctor-patient relationship, you think that has been: __ Achieved __ Almost achieved __ Little achieved __ Not achieved	What you expected to achieve with the rehabilitation, you think has been: __ Achieved __ Almost achieved __ Little achieved __ Not achieved
c) You hope that the things you have not achieved with regard to the control of your disease will be achieved in the: __ Short term __ Medium term __ Long term __ Never	You hope that the things you expected but have not achieved with the treatment will be reached in the: __ Short term __ Medium term __ Long term __ Never	You hope that the progress you expected but did not have will be achieved in the: __ Short term __ Medium term __ Long term __ Never	You hope that the things you expected but have not achieved with regard to the diagnosis will be achieved in the: __ Short term __ Medium term __ Long term __ Never	The way you would like the doctor-patient relationship to be, but has not been, you hope to achieve it in the: __ Short term __ Medium term __ Long term __ Never	The things you need but have not achieved in your rehabilitation may be achieved in the: __ Short term __ Medium term __ Long term __ Never
d)Not being able to achieve the things you hope and expect in the control of your illness, and remain as you are, will make you feel: __ Very bad __ Bad __ So-so __ The same __ (I accept it)	Not being able to achieve the things you hope and expect with the treatment, and remain as you are, will make you feel: __ Very bad __ Bad __ So-so __ The same __ (I accept it)	Not being able to achieve the things you hope and expect in the evolution of your disease, and remain as you are, will make you feel: __ Very bad __ Bad __ So-so __ The same __ (I accept it)	Not being able to achieve the things you hope and expect in the diagnosis of your disease, and remain as you are, will make you feel: __ Very bad __ Bad __ So-so __ The same __ (I accept it)	Not being able to achieve the things you expect in the doctor-patient relationship, and remain as you are, will make you feel: __ Very bad __ Bad __ So-so __ The same __ (I accept it)	Not being able to achieve the things you hope and expect in your rehabilitation, and remain as you are, will make you feel: __ Very bad __ Bad __ So-so __ The same __ (I accept it)

PEQL Categories			
Good	Acceptable	Poor	Bad