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Prevalence of Atherosclerotic Risk Factors in an Elderly Community of Low Social Condition

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The objective of preventive cardiology in elderly people is to delay as much as possible cardiovascular complications that can contribute to a still premature death. This can be done by controlling cardiovascular risk factors. The aim of this study was to determine the prevalence of cardiovascular risk factors in a community of elderly women of low social condition from Vitoria-Gasteiz. We studied a sample of 302 women older than 65 years from Vitoria-Gasteiz. The examination included these parameters amongst others: two blood pressure measurements following WHO normatives, weight and height, lifestyle questionnaire, ECG and blood sample to determine blood lipids, glucose and uric acid. The prevalence of cardiovascular risk factors observed were as follows: hypertension 47 %, which increases up to 58.6 % if we consider effective antihypertensive treatment (WHO) and 77.8 % (JNC-V), total cholesterol ≥ 240 mg/dl (6.2 mmol/l) 45.8 %, LDL-c ≥ 150 mg/dl (3.87 mmol/l) 58.6 %, triglycerides ≥ 200 mg/dl (2.3 mmol/l) 7.7 %, HDL-c < 35 mg/dl (0.9 mmol/l) 2.7 %, glucose ≥ 120 mg/dl (6.66 mmol/l) 29.7 %, uric acid ≥ 6 mg/dl (0.36 mmol/l) 33.1 %, overweight (BMI: 25–29.9 kg/m^2) 36.8 %, obesity (BMI ≥ 30 kg/m^2) 32.1 %, smoking (> 10 cigarretes) 4.0 %, alcohol consumption (> 20 g/d) 8.2 %, LVH (ECG) 16.9 % and 45 % physical inactivity. Only 2 % of the tested women did not have any risk factor, 4 % presented one, and the rest presented two or more cardiovascular risk factors. We can observe a very high prevalence of risk factors in this community of low social condition, higher than other studies made in elderly individuals. We think it is necessary to adopt preventive measures in this population, in order to decrease cardiovascular disease and to improve quality of life. *J Clin Basic Cardiol 2003; 6: 41–4.*

Key words: risk factors, elderly, social class

The cardiovascular risk factors in elderly people are similar to those that predispose middle-aged candidates for cardiovascular disease. Some risk factors, such as blood lipids, impaired glucose tolerance, fibrinogen and uric acid, are associated with lower risk ratios in advanced age, but this lower relative risk is offset by a high absolute risk. Thus, cardiovascular risk factors remain relevant at elderly age. Since the incidence of cardiovascular disease and the prevalence of the predisposing risk factors is so high in elderly people, the attributable risk is large, and the short-term potential benefit of treatment is actually greater in elderly people than in the middle aged [1].

Cardiovascular disease is the leading cause of death among women and men in developed societies [2]. Atherosclerosis is inextricably associated with aging [3] and is associated with progressive vascular accumulation of cholesterol-laden lipoproteins, and is linearly associated with the plasma level of low density lipoprotein (LDL) cholesterol.

Up to 80 % of deaths from coronary artery disease (CAD) occur after the age of 65 in both men and women. The rate of CAD is positively and independently related to the plasma level of LDL-c in both sexes over a wide age range [4]. This includes those aged over 80 years [5–7], although the strength of the association between CAD and LDL-c weakens with advancing age. Hypertriglyceridaemia and low levels of high density lipoprotein cholesterol may also be important risk factors in elderly people. It has also been demonstrated that increased uric acid levels are independently and significantly associated with cardiovascular mortality risk [8].

In developed countries, socio-economic status has been proved to be an important factor in the progression of cardiovascular disease. In a recent study [9], it was observed that educational level seemed to be the most important measure of the four socio-economic indicators (education, occupation, income and marital status) in relation to the cardiovascular risk factors in the study population. People with lower socio-economic status had higher levels of cardiovascular risk factors. The association between socio-economic status and cardiovascular risk factors was more consistent among women than men.

It is important to promote preventive measures in elderly individuals in order to reduce the risk of disease.

The aim of this study is to determine the prevalence of cardiovascular risk factors in an elderly female community of low social condition from Vitoria-Gasteiz, and to see if there are differences between our results and other studies that did not take into account socio-economic status.

Material and Methods

A randomised sample of 337 women older than 65 years from Vitoria-Gasteiz were selected. The studied persons were all of a low socio-economic class and received an economic grant for this reason from the Local Administration. From the selection of 337, 302 attended (response index: 89.6 %). For sample distribution see Table 1.

We sent a letter to each of the participants, explaining the main objectives, as well as the tests included in the exploration.

The examination included among others the following: a standardised questionnaire; measurement of blood pressure by specially trained technicians; weight and height to deter-

Table 1. Sample distribution

Age	Selected	Attended
65–80	173 (51.33 %)	156 (51.7 %)
≥ 81	164 (48.66 %)	146 (48.3 %)
Total	337	302

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mine body mass index (BMI), electrocardiogram and blood sample.

Questionnaire
Questionnaire included general data, past medical proved history and current medications.

Blood Pressure
A standard mercury sphygmomanometer was used. The participant's blood pressure was measured twice within an interval of ten minutes. The cuff was placed on the participant's right arm and inflated in 10 mmHg increments until the cuff pressure was 30 mmHg above the level at which the radial pulse disappeared. Blood pressure was measured following World Health Organisation (WHO) normatives [10] in a comfortable environment and allowing a 2–3 minute period of rest before blood pressure was measured.

Hypertension was defined according to WHO past criteria as mean values of systolic blood pressure (SBP) ≥ 160 mmHg and/or diastolic blood pressure (DBP) ≥ 95 mmHg. We also used Fifth Joint National Committee on Detection, Evaluation, and Treatment of Hypertension (JNC-V) criteria, that is SBP ≥ 140 and DBP ≥ 90 mmHg [11].

Body Mass Index
Body mass index was calculated by the weight in kilograms divided by the square of the height in metres (kg/m^2). Subjects were classified into four categories: underweight (BMI < 18.5), normal weight (BMI 18.5–24.9), overweight (BMI 25.0–29.9) and obesity (BMI ≥ 30) [12].

Table 2. Prevalence of hypertension according to WHO and JNC-V normatives

Type of hypertension	WHO	JNC-V
ISH	27.5 %	46.68 %
SDH	15.2 %	28.47 %
IDH	4.3 %	2.65 %
Hypertension	47.0 %	77.80 %

ISH: isolated systolic hypertension; SDH: systolic and diastolic hypertension; IDH: isolated diastolic hypertension

Table 3. Prevalence of cardiovascular risk factors according to age

Risk factor	65–80 years	>80 years	Total
BMI (kg/m^2):			
Overweight (25–29.9)*	41.7 %	35.3 %	36.8 %
Obesity (≥ 30)*	31.5 %	28.8 %	32.1 %
Physical inactivity**	38.5 %	52.1 %	45.0 %
Smoking ≥ 10 cigarettes/day	7.1 %	2.1 %	4.6 %
Glucose ≥ 6.66 mmol/l	30.3 %	29.2 %	29.7 %
Uric Acid ≥ 0.36 mmol/l*	27.50 %	38.88 %	33.10 %
Total cholesterol ≥ 6.2 mmol/l*	52.3 %	38.9 %	45.8 %
LDL-c ≥ 3.87 mmol/l**	65.2 %	50.8 %	58.6 %
HDL-c < 0.9 mmol/l	2.1 %	3.3 %	2.7 %
Triglycerides ≥ 2.3 mmol/l	7.8 %	7.6 %	7.7 %
Electrocardiogram disorders:			
Arrhythmias	16 %	19.9 %	17.9 %
LVH and/or LAH	27.6 %	26.0 %	26.8 %
Blocks*	18.6 %	30.1 %	24.2 %

*p < 0.05; **p < 0.01

Electrocardiogram
Electrocardiogram was carried out in all participants to identify principal rhythm disorders, myocardial infarction, presence of left ventricular hypertrophy and ST-segment and T-wave changes.

Blood Samples
Blood samples were taken, according to predefined protocols under non-fasting conditions to determine blood lipids, glucose and uric acid.

For laboratory measurements, an automated system was used (Technicon RA).

Total Cholesterol
Total cholesterol was measured with a fully enzymatic procedure with colorimetric determination at 500 nm.
- Normal: values below 5.17 mmol/l
- Borderline: values between 5.17–6.19 mmol/l
- Hypercholesterolaemia: values ≥ 6.2 mmol/l

HDL-Cholesterol
HDL-cholesterol was determined by adding phosphotungstic acid and magnesium ions to serum. The consequence is the precipitation of chylomicrons, VLDL and LDL. Floating of centrifugation has HDL-c and was determined by a fully enzymatic procedure with colorimetric determination at 500 nm. Values above 0.9 mmol/l were considered to be normal.

Low density lipoprotein cholesterol (LDL-c) was calculated according to the Friedewald equation for individuals whose serum triglycerides were ≤ 4.51 mmol/l:

LDL-c = total cholesterol – HDL-c – triglycerides/5

LDL-c values ≥ 3.87 mmol/l were considered to be high.

For the measurement of triglycerides and uric acid, a enzymatic and colorimetric method in the Technicon RA system was used. For triglycerides (TG), values ≥ 2.3 mmol/l were considered to be high, for uric acid values ≥ 0.36 mmol/l.

Glucose was measured by glucose-hexokinase method in the Technicon RA system. Values over 6.66 mmol/l were counted as high.

Statistical Analysis
Statistical analysis was performed using the SPSS program.

Results

The prevalence of cardiovascular risk factors observed were as follows: hypertension 47 % which increases up to 58.6 % if we consider effective antihypertensive treatment (WHO) and 77.8 % (JNC-V), total cholesterol ≥ 240 mg/dl (6.2 mmol/l) 45.8 %, LDL-c ≥ 150 mg/dl (3.87 mmol/l) 58.6 %, triglycerides ≥ 200 mg/dl (2.3 mmol/l) 7.7 %, HDL-c < 35 mg/dl (0.9 mmol/l) 2.7 %, glucose ≥ 120 mg/dl (6.66 mmol/l) 29.7 %, uric acid ≥ 6 mg/dl (0.36 mmol/l) 33.1 %, overweight (BMI: 25–29.9 kg/m^2) 36.8 %, obesity (BMI ≥ 30 kg/m^2) 32.1 %, smoking (> 10 cigarettes) 4.0 %, alcohol consumption (> 20 g/day) 8.2 %, LVH (ECG) 16.9 % and 45 % physical inactivity.

Only 2 % of the women did not have any risk factor, 4 % presented one, 12.9 % two, 17.9 % three and the rest presented four or more cardiovascular risk factors.

Table 2 shows the prevalence of isolated systolic hypertension, isolated diastolic hypertension, systolic and diastolic hypertension and total, according to WHO and JNC-V criteria. Isolated systolic hypertension is the most frequent type of hypertension according to both classifications.

In relation to the prevalence of cardiovascular risk factors according to age, we found a statistically significant relation between age and overweight, obesity, physical inactivity, uric acid, total cholesterol and LDL-c. In relation to electrocardiogram disorders we only saw statistically significant relations between blocks and age (Table 3).

We found that the prevalence of total cholesterol, LDL-c, triglycerides, overweight and obesity decreases with age. On the contrary the prevalence of physical inactivity, uric acid and blocks increases with age.

We also found mean serum values of total cholesterol and LDL-c to significantly decrease with age ($p < 0.01$) (Table 4); as far as mean serum values of triglycerides and HDL-c are concerned we did not notice any changes.

Table 4. Mean values and standard deviation of total cholesterol and LDL-c according to age

Age	T. C.* mean ± SD	LDL-c* mean ± SD
65–80	6.3 ± 1.1 mmol/l (245.02 ± 42.88 mg/dl)	4.3 ± 0.9 mmol/l (166.32 ± 37.04 mg/dl)
> 80	5.9 ± 1.1 mmol/l (229.53 ± 41.33 mg/dl)	3.9 ± 0.9 mmol/l (151.40 ± 37.74 mg/dl)
TOTAL	6.1 ± 1.1 mmol/l (237.52 ± 42.77 mg/dl)	4.1 ± 0.9 mmol/l (159.47 ± 38.03 mg/dl)

*$p < 0.01$

Discussion

In the majority of the epidemiological studies the prevalence of hypertension in elderly individuals is higher in women than in men. Between 38–46 % of men and 48–66 % of women (WHO) according to an international review made by Bots [13]. In Spain, and using the same criteria, the prevalence of hypertension among elderly women ranges from 50 to 56 % [14–19]. The prevalence of hypertension in our sample is 47 %, which increases up to 58.6 % if we include those with effective antihypertensive treatment.

If we follow JNC -V criteria, we find that the prevalence of hypertension published by other authors [14, 20, 21] is between 61.3 % and 74.2 % in elderly women. In our study we found a higher prevalence: 77.8 %.

Among elderly hypertensives, isolated systolic hypertension (ISH) is the most frequent type of hypertension. In the Framingham study, ISH accounted for approximately two-thirds of all cases of hypertension among individuals over 65 years old [22]. In our sample ISH occurs in 58.45 % (WHO) and 62.11 % (JNC-V) of all hypertensives and 27.50 % (WHO) and 46.68 % (JNC-V) of the sample. An epidemiologic review found that estimates of the prevalence of ISH range from 1 % to 41 % [23]. This large variability is the result of several factors, including the diagnostic criteria used of ISH, ie, age, gender, race, geography, social class, and number of blood pressure determinations.

Analysing the lipid profile of our sample, we observed a mean value of total serum cholesterol of 6.14 ± 1.1 mmol/l, which is superior to those reported by other authors [6, 24, 25]. These differences could be due to multiple reasons, for example different life and diet habits in the population studied. We have found in our sample a prevalence of total cholesterol ≥ 6.2 mmol/l of 45.8 % which is superior to that reported by ECEHA, 29.22 % [14].

As other authors, we have found the prevalence of high total cholesterol in women to descend from 70–75 years onwards [3, 14, 26–28]. In our study this descent was statistically significant (52.3 % vs. 38.9 %) ($p < 0.05$). In the old aged, this decrease of hypercholesterolaemia parallels weight loss.

We have found a mean value for HDL-c of 1.52 ± 0.40 mmol/l which is similar to the mean value in the Cardiovascular Health Study, 1.52 ± 0.41 mmol/l. Only 2.7 % of our sample had HDL-c < 0.9 mmol/l, which is clearly lower than other studies [24, 29].

We saw a mean serum value for triglycerides of 1.2952 ± 0.57 mmol/l and 7.7 % of hypertriglyceridaemia.

It is mentioned in the literature that smoking decreases with age [30] and is less common in the elderly than it is in younger adults. In our case, the prevalence of smokers was 8.9 % (current and past smokers) and about half of them were current smokers (4.6 %; 7.1 % below 81 years and 2.1 % older than 80 years). This results agree with the ones reported in ECEHA. They observed a statistically significant reduction ($p < 0.001$) in smoking habit according to age (9.8 % vs. 5.7 %). As the National Health Questionnaire carried out by the Spanish Government [31], they have seen that in elderly people there are more smokers among males than among females, these prevalences were respectively 18.5 % vs. 0.9 % and 33 % vs. 2 %. This low prevalence of smokers in elderly females could be due to social reasons.

We have found a mean value of glucose of 6.667 ± 2.89 mmol/l and the prevalence of glucose ≥ 6.66 mmol/l 29.7 % which is higher than that reported by other authors which ranges between 16–18 % [14, 24, 29].

We can see that the prevalence of hypertension and other cardiovascular risk factors are especially high in this group, higher than other studies made in the elderly. This is probably due to their low socio-economic class. If we consider that the control of risk factors is as effective in middle aged individuals as in older ones, we consider that it is necessary to take preventive intervention measures in this population.

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