BRIEF REPORT

Association of Coronary Risk Factors in Old Age. AFRICA Study

Carlos A. Paterno,[a] Cecilia I. Cornelio,[b] and Juan C. Giménez[c], on behalf of the researchers of the AFRICA study

[a]Sociedad de Cardiología Buenos Aires, Federación Argentina de Cardiología, Buenos Aires, Argentina.
[b]Cátedra de Salud Pública, Universidad de Buenos Aires, Buenos Aires, Argentina.
[c]Medicina Preventiva, Hospital Pirovano, Buenos Aires, Argentina.

We carried out a multicenter cross-sectional study in Argentina to investigate the prevalence of behavioral and other risk factors for coronary heart disease in patients aged 90 years or more and to study the association between risk factors and longevity. Data were collected on 322 individuals aged 90 years or more, 47% of whom had a family history of longevity. The majority ate meals comprising mainly fruit, milk and vegetables every day and half of the participants drank a moderate amount of red wine. On average, their body mass index was normal and they regularly took some form of physical activity. Generally, diabetes mellitus was associated with obesity. The onset of arterial hypertension occurred at the high average age of 72 years. Few were found to be current smokers. Few individuals had two concurrent risk factors, and even fewer had three concurrent major coronary risk factors. In conclusion, patients aged 90 or more in our series showed characteristics indicating both a genetic trait and environmental factors favouring longevity.

Key words: *Epidemiology. Risk factors. Longevity.*

Asociación de factores de riesgo coronario en la ancianidad. Estudio AFRICA

Se diseñó un estudio epidemiológico transversal multicéntrico, en Argentina, con el objetivo de conocer la prevalencia de las conductas y de los factores de riesgo para la enfermedad arterial coronaria en pacientes de 90 años o más, así como conocer la posible agregación de éstos y observar qué hallazgos estarían asociados con la longevidad. Se encuestó a 322 ancianos de 90 años de edad o mayores, de los que el 47% tenía familiares longevos. Una mayoría consumía frutas, lácteos y verduras con regularidad, y aproximadamente la mitad bebía vino tinto. Predominó un índice de masa corporal normal y realizaban actividad física con regularidad. La diabetes mellitus se asociaba con la obesidad. La hipertensión arterial se observó a una edad de comienzo muy avanzada (72 años). Se halló un escaso porcentaje de fumadores. La agregación de 2 factores de riesgo fue poco frecuente, y aún menor cuando se asociaban 3 de ellos. En conclusión, la población de edad muy avanzada en nuestro medio presentaba características que indican que hay a la vez un componente genético y factores ambientales favorecedores de longevidad.

Palabras clave: *Epidemiología. Factores de riesgo. Longevidad.*

INTRODUCTION

Atherosclerotic disease (AD) develops depending on hereditary characteristics and exposure to risk factors (RF), environmental factors and lifestyle. The control of RF in the population by means of cardiovascular prevention programs is one of the aims of public health and health care systems, and it may contribute to longer life expectancy and a better quality of life. The increase in the average life expectancy is a social phenomenon with important health and economic repercussions. The aim of this study was to determine the prevalence of RF for AD, as well as the behavior and habits considered to be protective, in a group of patients aged 90 years or over with retained autonomy.

METHODS

We undertook a cross-sectional, epidemiological study including 18 health centers from the Federal Capital and 4 provinces in Argentina. During 2000 and 2001 we undertook consecutive interviews of 322 men and women older than 90 years of age who attended public or private centers for regular medical check-ups. The subjects were not representative of the local or general population. The study only included those

Correspondence: Dr. C.A. Paterno Marchioli (FESC).
Centro di Cardiologia Clinica e Strumentale: Dott. Paolo Telesforo.
Via Rosati 137, Foggia 71100 (FG), Italy.
E-mail: carlos_paterno@tiscali.it

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TABLE 1. **Regular Consumption of Foodstuffs (Mean Weekly Frequency)**

Food	Days per Week
Fruit	5.8
Dairy products	5.6
Vegetables	4.7
White meat	3.1
Pasta/rice	2.7
Red meat	2.2
Eggs	1.8

TABLE 2. **Age, Lifestyle, Habits, Inheritance, Risk Factors***

	Total n=322	Men n=85	Women n=237	*P*
Age, y	92.3	92	92.5	<.05
Drinkers	48	61	43	<.001
Ex-drinkers	10	18	8	<.05
Non-drinkers	42	21	49	<.05
Smokers	3.8	4.8	3.4	<.001
Ex-smokers	23.8	57	12	<.05
Non-smokers	72.4	38	85	<.05
Long-lived relations	47	51	46	NS
Physical activity	59	76	53	<.001
Diabetes mellitus	6.3	9.5	5.1	NS
Hypercholesterolemia	18	14	19	NS
Hypertension	52	51	55	NS
BMI	24	24.5	23.7	NS

*BMI indicates body mass index.
Figures in percentages, except for age and BMI.

subjects with whom it was possible to establish a normal doctor-patient relationship and who had very few psychological or physical problems. Subjects were excluded if they were hospitalized, were acute or had important hypomnesia that prevented them answering the questionnaire suitably, thereby selecting the study population even further. According to figures from the Argentine National Institute of Statistics and Censuses (INDEC-2001), the ratio of the selected sample to the population aged ≥90 years (N=96041) was 1:298.

The following variables were recorded: identity, sex and age (controlled from documents), and usual diet. For the diet, the subjects answered direct questions posed by the physicians using a standardized seven-day questionnaire about the regular intake of drink and food (pasta, rice, greens, fruit, eggs, red and white meat, water, wine, beer, etc), as well as the frequency of their activities and whether they adhered to established times for their usual daily activities (meals, sleep, walks, etc).

Details were also taken of any family history of RF, early cardiovascular death and nonagenarians, menopause, smoking and drinking habits, giving more importance to their qualitative (continuity, regularity) than their quantitative terms, physical exercise (walks or regular exercise, or lack of these), obesity (controlled at the time of inclusion to the study with reliable methods), height (in meters with two decimal points), weight (in kilograms with one decimal point) and body mass index (BMI), diabetes mellitus (DM), as diagnosed by their general practitioner or because they were already receiving therapy with specific drugs, and hypercholesterolemia, according to a history of three or more measurements of total cholesterol ≥240 mg/dL. Hypertension was defined by blood pressure (BP) measurements ≥140/90 mm Hg during adulthood[1] or the taking of specific therapy. The age at which hypertension was diagnosed was also noted.

No details were recorded of non-measurable variables, such as psychological attitudes (discipline, optimism, routine), which could have been useful for a wider evaluation.

Statistical Analysis

The statistical procedures used included the 2-way Student *t* test for continuous and independent variables. The results are expressed as the mean ± standard deviation (SD). If the distribution of the variable was not Gaussian, we used the median as the central estimator and the equivalent non-parametric tests (Wilcoxon test). The χ^2 test was used to compare proportions (qualitative data) expressed as an absolute value and a percentage. A $P<.05$ was considered to be statistically significant. The analysis of the data was done using the statistical package STATA™ version 6.0.

RESULTS

A total of 322 long-lived persons were interviewed, of whom 237 (74%) were women. The mean age was 92.3±2.6 years (range, 90-107 years). The ratio of women to men (237/85=2.8) was the same as the figures recorded by the INDEC-2001 in the population aged ≥90 years (70 852/25 70852/25189). Forty-seven percent of subjects had at least one relative who had been or was long-lived (father, grandfather or brother ≥90 years of age), there with no difference between the men and women.

The age of the menopause for the long-lived women was 48±5.4 years. Those women who had their menopause at a later age were no older than the others.

The nonagenarians were regular consumers of fruit, vegetables and dairy products (Table 1).

Almost 50% of the subjects were moderate drinkers of red wine.

There was a high prevalence of non-smokers (72.4%), most of whom were women.

Almost 60% undertook some form of regular physical activity. BMI was mainly normal (24±3.8). DM was associated with obesity (25%). No subject had

insulin-dependent DM. A low proportion of the subjects had hypercholesterolemia. No correlation was seen between obesity and hypertension. When hypertension was present, it had started at a very high age (72 years) (Table 2), and 50% of the subjects with hypertension were between 60 and 85 years of age at the time of diagnosis, with none being younger than 50 years of age at the time of diagnosis.

There was a reduced percentage of men with hypertension and hypercholesterolemia.

Very few subjects had three or more RF (Table 3).

TABLE 3. **Percentages of Old Persons With 3 Risk Factors***

HT+HC+smoking	0.4
HT+HC+DM	0.8
HT+HC+male	2.4
HT+HC+sedentary lifestyle	4.3

*HT indicates hypertension; HC, hypercholesterolemia; DM, diabetes mellitus.

DISCUSSION

Atherosclerotic disease is a chronic, progressive clinical entity that begins at an early age. Different RF are involved in the development of AD, including hereditary, environmental or behavioral factors. Long-lived patients who are still autonomous may hypothetically have protective factors and/or fewer RF which afford a better quality of life.

In Okinawa, Japan, the proportion of centenarians is the highest in the world (33.6/100 000 inhabitants). Argentina has 5/100 000 (INDEC-2001). Life expectancy in Japan is 79.9 years and in Argentina it is 72.9 years. People in Japan consume a diet based on vegetables and fish, continue being physically active until old age, and women reach their menopause at a later age.

Age is the most powerful independent RF for the prognosis of death and disease due to AD.

Male sex is associated with greater cardiovascular complications, which was corroborated in our series by the ratio between the sexes.

A daily food intake rich in fruit and vegetables with a low intake of fats and a reduced intake of saturated fatty acids may lower blood pressure in adults (DASH study).[2] Our older subjects had a similar nutritional pattern, although we do not know exactly since when they had had this habit or how much protection it afforded.

The proportion of smokers in Argentina is 28% at 19 years of age,[3] a figure that rises to 44% among those persons who have had a myocardial infarction (MI). The percentage of ex-smokers and non-smokers found in our study could account for one aspect of their longevity.

The most important variable in lifestyle is physical activity. The World Health Organization has repeatedly confirmed the importance of regular physical activity in old age, in an attempt to preserve functional ability as much as possible.

We detected no association between obesity and hypertension, unlike that seen in children and adults. The subjects in this sample may have had a different mechanism (e.g., arteriolosclerosis). Overweight, however, was associated with DM.

A reduction in cholesterolemia results in a lower incidence of death from ischemic heart disease and cardiovascular disease.[4] The low prevalence of hypercholesterolemia might be linked to the longevity, although other factors, such as HDL cholesterol, Apo B/Apo A, or Lp-PLA$_2$, would be required to confirm this in more detailed studies.

Fourteen percent of adolescents in Argentina have high blood pressure figures,[3] a percentage that increase among adults (56% in MI). Considering the age of onset of hypertension among the long-lived subjects in this study (72 years), it might be due to arteriolosclerosis rather than to essential hypertension, a possibility that would be supported by the lack of persons whose hypertension had started before the age of 50 years. Essential hypertension during the first decades would lead to a high rate of death and disease in the long term.

Risk factors interact positively, such that cardiovascular risk derived from the simultaneous exposure to several risk factors is greater than would be expected by the simple addition of the corresponding factors.[5] The combination of the additive and synergistic effects of RF on cardiovascular death have been evaluated in epidemiological studies carried out mainly in a North American population.[6] In a study of French persons aged <55 years, the combination of hypertension and hypercholesterolemia increased the risk for AD, especially among men.[7] Although the finding of a reduced percentage of men with both hypertension and hypercholesterolemia does not enable us to conclude that there is a cause-effect association, later studies might clarify this observation better.

Quantification of such values as optimism, discipline, order and precision regarding their effect on cardiovascular protection is difficult. Nevertheless, it is notable that the long-lived persons in this study usually had routines in their customs and behavior, such as physical activity, respect for times, regular and moderate drinking, etc. It would be interesting to determine whether this pattern of lifestyle is associated with being a centenarian.

Limitations

This selection of a population of nonagenarians with the fewest number of psychological and physical limitations implies loss of representativity of the general population of long-lived persons. On the other hand, it has the advantage that the historical data

obtained from the interview are more precise. The low prevalence of RF in an individual may result in an improved quality of life. We consider that wider studies are warranted in order to determine whether control of the RF at earlier ages could help persons reach an older biological age in a good psychological and physical state.

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