



Original article

Arterial stiffness in normotensive and hypertensive subjects: Frequency in community pharmacies[☆]



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ARTICLE INFO

Article history:

Received 5 January 2017

Accepted 20 April 2017

Available online 10 November 2017

Keywords:

Arterial stiffness
Target organ lesion
Pulse wave velocity
Brachial oscillometry
Prehypertension
Community pharmacies

ABSTRACT

Background and objective: Arterial stiffness (AS) is a well-recognized target organ lesion. This study aims to determine: (1) the frequency of AS in community pharmacies; (2) if stiffened subjects identified by brachial oscillometry have more CV risk factors than normal subjects, and (3) the dependence of stiffness on using either age-adjusted values or a fixed threshold.

Patients and method: Observational, cross-sectional study in 32 community pharmacies of the Valencia Community, between November/2015 and April/2016. Stiffness was as pulse wave velocity (PWV) measured with a semi-automatic, validated device (Mobil-O-Graph[®], IEM), followed by a 10-item questionnaire.

Results: Mean age of the 1427 consecutive recruited patients was 56.6 years. Overall proportion of patients with AS was 17.4% with age-adjusted PWV (9.4% in normotensives, 28.3% in hypertensives). Multivariate logistic regression showed independent association of stiffness in normotensives with male gender, obesity, higher pulse pressure and heart rate, in hypertensives, with higher pulse pressure and lower age. AS was globally found in 20.5% of subjects, defining stiffness by PWV > 10 m/s (6.2% in normotensives, 40.2% in hypertensives). It was associated with higher age and pulse pressure in both groups. Concordance in classifying stiffness was 74.6%.

Conclusions: Frequency of AS varied between 17.4% and 20.5%. Age-adjusted stiffness is associated in normotensives with male gender, pulse pressure, obesity and heart rate, in hypertensives with pulse pressure and inversely to age. Stiffness by 10 m/s is determined by higher pulse pressure and higher age. Both definitions of PWV are not interchangeable.

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Rigidez arterial en sujetos normotensos e hipertensos: frecuencia en farmacias comunitarias

RESUMEN

Antecedentes y objetivo: La rigidez arterial (RA) es una lesión de órgano diana reconocida. El objetivo es determinar: 1) su frecuencia en farmacias comunitarias; 2) si sujetos con RA presentan más factores de riesgo CV, y 3) su dependencia de una definición ajustada por grupos de edad o valores fijos.

Pacientes y método: Estudio observacional transversal en 32 farmacias comunitarias de la Comunidad Valenciana entre noviembre de 2015 y abril de 2016. La RA como velocidad de onda de pulso (VOP) se midió mediante un dispositivo validado semiautomático (Mobil-O-Graph[®], IEM), seguido de un cuestionario de 10 preguntas.

Palabras clave:

Rigidez arterial
Lesión de órgano diana
Velocidad de onda de pulso
Oscilometría braquial
Prehipertensión
Farmacias comunitarias

[☆] Please cite this article as: Rodilla Sala E, Adell Alegre M, Giner Galvañ V, Perseguer Torregrosa Z, Pascual Izuel JM, Climent Catalá MT, et al. Rigidez arterial en sujetos normotensos e hipertensos: frecuencia en farmacias comunitarias. Med Clin (Barc). 2017;149:469–476.

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[◇] The names of the 32 cooperating pharmacies are listed in Annex 1.

Resultados: La edad media de los 1.427 participantes consecutivos fue 56,6 años. La proporción de pacientes con RA fue 17,4% (9,4% en normotensos, 28,3% en hipertensos) con ajuste por grupos de edad. La regresión logística multivariante mostró en normotensos una asociación de la RA con el sexo masculino, la obesidad, una mayor presión de pulso y la frecuencia cardiaca, y en hipertensos, con una mayor presión de pulso y una menor edad. Definiendo RA por VOP > 10 m/s, el 20,5% global (6,2% en normotensos, 40,2% en hipertensos) presentó RA. Se asoció a mayor edad y presión de pulso en normotensos e hipertensos. La concordancia de RA entre ambas definiciones fue del 74,6%.

Conclusiones: La RA varió entre el 17,4 y el 20,5%. La RA ajustada por edad se asocia en normotensos a sexo masculino, presión de pulso, obesidad y frecuencia cardiaca, y en hipertensos, a mayor presión de pulso y menor edad. Los determinantes de RA medida como VOP > 10 m/s son mayor presión de pulso y mayor edad. Ambas definiciones de RA no son superponibles.

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Introduction

The stratification of cardiovascular (CV) risk¹ has represented a significant milestone in the treatment of coronary and cerebrovascular diseases, which continue to be the main cause of global mortality.² However, the prognostic value of traditional risk tables is limited. In several studies it is shown that, in absolute numbers, death is more frequent in the group classified as low- or intermediate-risk group compared to the high-risk group.^{3,4}

The CV risk tables do not include the so-called subclinical markers of target organ damage (TOD), such as left ventricular hypertrophy (LVH), microalbumin, carotid plaques, carotid intima-media thickness, or ankle-brachial index. It has been admitted that all of them have a prognostic value beyond the risk tables, having been strongly recommended by current guidelines.⁵

In the last decades a new TOD has emerged as a very useful tool to define vascular injury: arterial stiffness (AS), measured by pulse wave velocity (PWV).⁶ It has been defined as the velocity at which the pulse wave travels a defined distance in the thoracic aorta. Its predictive value has been consistently shown in various populations.^{7,8} However, AS shares similar deficiencies with other TODs and, in particular, their limited access to broad-based clinical practice in real life, and their use is restricted to specialized units.

Another handicap associated with TODs is the changing definition of its thresholds. Physicians tend to simplify continuous, but not necessarily linear, associations between TODs and risk, setting thresholds of normality. However, these limits are susceptible to be changed by increasing the evidence of more adequate thresholds. In recent years, LVH and microalbumin levels have experienced considerable modifications. Similarly, the first definition of 12 m/s as high AS was changed in 2012 to 10 m/s.⁹ In addition, the use of certain TODs is recommended in accordance with the predefined ranges of normality in certain age groups, consisting of normal population.

This study has a triple purpose: (1) to measure the As rate in subjects attending community pharmacies; (2) to determine if subjects with stiffness identified by brachial oscillometry have more CV risk factors than normal subjects, and (3) to analyze the dependence of stiffness on the use of values adjusted for age or a fixed value.

Material and methods

Study

Cross-sectional study of subjects who spontaneously visited community pharmacies for a period of 6 months.

Pharmacy selection

The Spanish Society of Family and Community Pharmacy of the Region of Valencia (SEFAC-CV) is a national registered, scientific,

professional and non-profit society, with regional branches, gathering pharmacists interested in the scientific progress for public health. During the first half of 2016, pharmacies affiliated to the SEFAC-CV were able to join the Epidemiological Study to quantify the prevalence of arterial hypertension and arterial stiffness at Community Pharmacies of Comunidad Valenciana (RIVALFAR Project). Finally 32 of them, belonging to Comunidad Valenciana, decided to participate freely.

Selection of subjects

From November 2015 to April 2016, all subjects who attended the participating pharmacies for any reason were requested to participate in the study. Inclusion criteria were age >20 years and voluntary participation. The exclusion criteria were mental incapacity to understand the project or refusal to participate. Each patient was verbally explained the objectives and methods of the study, followed by a written description of the project and the measures to maintain confidentiality in accordance with the legal framework in force in Comunidad Valenciana (Law 5/1999 and subsequent regulations). All gathered information was deemed confidential, and reported anonymously. This information cannot be used to identify the patients, being the only link between them and the data a code exclusively used by RIVALFAR. Before accessing the data, all investigators must sign a document to ensure confidentiality. The study does not involve either sample randomization or the application of any additional intervention. All patients should read the "Patient Information Form" prior to inclusion.

RIVALFAR has been reviewed and approved by the Ethical Committee for Clinical Research of Sagunto Hospital, by the Ethics Committee of CEU Cardenal Herrera University and by the Ethical Committee of Clinical Research of the General Directorate of Public Health.

Procedures

In all patients, the clinical history was assessed using a standard questionnaire. Body weight, height and waist circumference were measured, and the body mass index was calculated. Blood pressure (BP) was measured with Mobil-O-Graph® brachial oscillometry (IEM GmbH, Stolberg, Germany), a semi-automatic blood pressure monitor validated by ESH. An automatic sphygmograph was used for the measurements, the patient being alone and at rest. The Mobil-O-Graph® automatically performs a first measurement, for calibration purposes. After a one-minute interval, a second measurement is carried out to calculate the PWV. Hypertension was defined as SBP ≥ 140 or DBP ≥ 90 mmHg, except in patients aged over 70 years (SBP > 150 mmHg) and diabetic patients (DBP ≥ 85 mmHg). The SBP was adjusted by calculating the pulse pressure tertiles, since this variable includes SBP and DBP in its

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