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Prevalence of Abdominal Aortic Aneurysms in the General Population and in Subgroups at High Cardiovascular Risk in Italy. Results of the RoCAV Population Based Study

Francesco Gianfagna [a,b,*], Giovanni Veronesi [a], Matteo Tozzi [c], Antonino Tarallo [c], Rossana Borchini [d], Marco M. Ferrario [a,d], Lorenza Bertù [a], Andrea Montonati [a], Patrizio Castelli [c], RoCAV (Risk of Cardiovascular diseases and abdominal aortic Aneurysm in Varese) Project Investigators [†]

[a] EPIMED Research Centre, Department of Medicine and Surgery, University of Insubria, Varese, Italy
[b] Department of Epidemiology and Prevention, IRCCS Istituto Neurologico Mediterraneo Neuromed, Pozzilli, Italy
[c] Research Centre for Vascular Surgery, Department of Medicine and Surgery, University of Insubria, Italy
[d] Occupational and Preventive Medicine Unit, University Hospital of Varese, Varese, Italy

WHAT THIS PAPER ADDS

Screening detected AAA prevalence in men aged 65—75 years from an Italian general population is 1.9% with peaks of more than 4% in patients with previous myocardial infarction and in ever-smokers. Both a general screening program in men aged 65—75 years and an approach targeted to subgroups at higher risk merit evaluation in a cost-effectiveness study.

Objectives: Prevalence data on abdominal aortic aneurysm (AAA) in women, subjects younger than 65 years and in subgroups carrying specific risk factors are scarce. AAA prevalence was evaluated in an Italian population including women and younger subjects, stratifying for the presence of cardiovascular disease (CVD) risk factors and CVD risk score.

Materials and methods: A population based cross-sectional study was conducted between 2013 and 2016. Men aged 50—75 and women aged 60—75 years, resident in the city of Varese (northern Italy), were randomly selected from the civil registry. A vascular surgeon performed an abdominal aortic ultrasound scan at four sites using the leading edge to leading edge method. CVD risk score was computed using the ESC-SCORE algorithm. The age and gender specific prevalence was estimated, stratifying by the presence of CVD and cardiovascular risk factors.

Results: Among the 3755 subjects with a valid ultrasound measurement, 63 subjects with an AAA were identified (5 referred for surgical intervention), among whom 34 were not previously known (30 men 1.3%, 95% CI 0.9—1.8; 4 women 0.3%, 95% CI 0.1—0.8). Considering age classes in men only, the highest prevalence of screen detected AAA was found in subjects aged 65—70 (1.2%; 95% CI 0.4—2.5) and 70—75 (2.5%; 95% CI 1.4—4.0) years. Among 65—75 year old men, the highest AAA prevalence was found in subjects with a previous myocardial infarction (MI 4.9%, 95% CI 2.0—9.9) and in ever-smokers reporting more than 15 pack years of smoking (4.1%, 95% CI 2.5—6.3). Among the younger subjects, those having an ESC-SCORE higher than 5% or a previous CVD (MI or stroke) showed a prevalence of 1.4% (95% CI 0.3—4.2; prevalence including subaneurysms 6.7%, 95% CI 3.7—11.0%).

Conclusions: In the study population, both a general screening program in 65—75 year old men and an approach targeted to subgroups at higher risk merit evaluation in a cost-effectiveness study. In 50—64 year old men, strategies for population selection should consider CVD risk stratification tools.

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[†] The full list of RoCAV investigators is in the Supplementary Material.

* Corresponding author. Research Centre in Epidemiology and Preventive Medicine (EPIMED), Department of Medicine and Surgery, University of Insubria, Via Rossi 9, 21100 Varese, Italy.,

E-mail address: francesco.gianfagna@uninsubria.it (Francesco Gianfagna).

Twitter: @Uni_Insubria

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INTRODUCTION

In Western countries, abdominal aortic aneurysm (AAA) affects about one subject in 20 over a lifetime.[1] AAA rupture is a life threatening condition that leads to death in 80% of cases and is responsible for 1–2% of deaths in those older than 65 years.[2] Since AAA is asymptomatic, screening the general population by ultrasound is thought to be beneficial for early identification and treating patients[3] whenever prevalence in the target population is high enough to go beyond the cost-effectiveness threshold. Recent analyses from Western countries suggested that screening programs in 65 year old men reduced all cause and AAA specific mortality, and were cost-effective starting from disease prevalence around 1% or even less.[3,4]

The first data from trials conducted in Western countries indicated a prevalence of 4–7% among men older than 65 years.[5–8] Recent population based studies found instead a decreased prevalence down to 2% in 65 year old individuals, which is lower than expected probably due to a reduction in smoking habits in recent years.[9] AAA was associated with older age, male sex, smoking, hypertension, family history of AAA, and previous cardiovascular diseases (CVD).[10,11] Subjects carrying CVD risk factors are therefore at higher risk and a screening program in this subgroup is expected to have favourable cost-effectiveness.[4] Based on the available evidence, some Scientific Societies have recommended performing screening in all 65 year old men, while others have suggested targeting the intervention to ever-smokers or subjects having a family history of AAA.[12] Following the guidelines and according to country specific prevalence data, some countries implemented a national screening program, with different strategies and with a resulting reduction in mortality.[13–15]

The prevalence of AAA in the general population is available for high risk countries, but few data are available for southern Europe, where there is no national AAA screening program. Moreover, very few data are available for the younger people and for women, as well as for AAA prevalence in subgroups carrying specific risk factors.[16] The aim was to evaluate AAA prevalence in an Italian population, from a randomised sample of citizens from a north Italian city participating in the RoCAV (Risk of Cardiovascular diseases and abdominal aortic Aneurysms in Varese) population based study.[17] The prevalence among population subgroups at higher risk was also investigated, using CVD risk factors beyond age and sex, and in subjects classified at high CVD risk using a standard CVD risk score.

MATERIALS AND METHODS

Study population

A detailed description of the population based RoCAV Study has been reported by Gianfagna et al.[17] Participants were citizens of Varese (79,793 inhabitants, the main city in a district area of 1 million inhabitants, northern Italy; Supplementary Fig. 1), randomly selected from civil registries through randomisation stratified for sex and 5 year age classes (men 50–75 years, women 60–75 years). No exclusion criteria were used. Among 5918 invited subjects, 3777 were finally recruited between 2013 and 2016. The participation rate was 63.8% in the whole sample, but lower in younger men (50–54 years, 58.6%, and 55–60 years, 65.2%) and in women (range 58.6–64.1%) than in 60–75 year old men (range 66.2–67.6%).[17] The study was approved by the Varese Hospital Ethical Committee and all participants provided written informed consent.

Data collection

In a quiet room, trained operators measured the blood pressure three times on the dominant arm with participants sitting down for at least 5 min and waiting 1 min between measurements. A blood sample was then collected (overnight fasting) between 8:00 a.m. and 9:30 a.m., for laboratory analysis and for storage in the project biobank. Serum lipids and blood glucose were analysed in the centralised hospital laboratory using commercial reagents and automatic analysers. Lifestyle data and clinical, pharmacological, and family history were collected by trained operators using computerised questionnaires. Height and weight were measured in subjects without shoes and wearing only light indoor clothing. All methods adhered to the standardised procedures and quality standards of the European Health Examination Survey (EHES)[18] and the WHO MONICA Project.[19]

A trained vascular surgeon performed the abdominal aortic ultrasound scan. The aortic images were obtained using the leading edge to leading edge method.[20] The antero–posterior and transverse diameters were measured using an Esaote scanner with a Convex 3.5 MHz transducer (Esaote, Genoa, Italy) at the following sites: the proximal aorta just below the superior mesenteric artery, the juxtarenal aorta at level of renal arteries, the proximal infrarenal aorta 2 cm below the renal arteries, the distal infrarenal aorta 1 cm above the bifurcation, and the point of maximum infrarenal aortic diameter if different from the standard measurement sites. A 5 s video of the abdominal aorta was also registered. Files were stored and a vascular imaging physician checked all images of $\geq$25 mm diameter plus a 5% random sample. AAA was defined by a diameter of 30 mm or more in either antero–posterior or transverse diameter of the juxtarenal, infrarenal, or aortic carrefour sites.[4,21] A subaneurysm was defined by any of the three diameters between 25 and 29.9 mm.

Statistical analysis

The demographic and clinical characteristics of the study population were summarised using either the mean $\pm$ standard deviation, or frequency distribution, for continuous and discrete variables, respectively. Descriptive statistics were computed separately for men and women, and by AAA in men only. The null hypothesis of no association between clinical features and AAA in men was tested

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