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Original Research Article

Prevalence of cardiovascular disease risk factors in Tallinn, Estonia

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ABSTRACT

Background and objective: Cardiovascular diseases are still a major public health concern in Estonia despite the decline in the mortality rate during the past decade. For better preventive strategies we aimed to investigate the prevalence of cardiovascular disease risk factors and their relations with age, gender and ethnicity.

Materials and methods: The cross-sectional study was carried out in Tallinn, Estonia. Two hundred individuals from each of the sex and 10-year age group (range 20–65 years of age) were randomly selected and invited to participate. Final study sample consisted of 511 men and 600 women (mean age of 46 years). Physiological measurements were taken and blood samples were drawn for standard measurements of the following markers: total cholesterol, high- and low-density lipoprotein cholesterol, apolipoproteins, triglycerides, glucose and inflammatory markers.

Results: Overall, 31% of the study subjects had high blood pressure, 23% had metabolic syndrome, and 55% were overweight/obese. The prevalence of all risk factors increased with age amongst both genders. The proportion of individuals having increased cholesterol, apolipoprotein B-100, and homocysteine levels was very high amongst both genders (60–80%). More Russians and other ethnic minorities compared to ethnic Estonians had calculated 10-year CHD risk ≥ 10%.

Conclusions: The study established a high prevalence of cardiovascular disease risk factors in Estonian adults (20–65 years of age). Younger portion of the population and some extent ethnic considerations should be taken into account when designing future studies, health prevention activities and interventions.

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1. Introduction

According to European cardiovascular disease statistics [1] in 2010, Estonia ranked third amongst men and fourth amongst women when considering the proportion of years lost due to cardiovascular diseases (CVD), outperformed only by the Russian Federation and Hungary (and additionally Slovakia amongst women). CVD is thus a major public health concern in Estonia. This disease makes a significant contribution to potential years of life lost (25%), kills approximately 10,000 people per year and has one of the highest surgical CVD treatment rates when compared to other European countries [1,2].

There is a need for studies that could describe, evaluate, and provide a broader understanding of the situation in Estonia in terms of CVD risk factors. For example, the importance of cholesterol level in CVD prevention is widely known, but there is no data available for the Estonian population regarding mean high- and low-density lipoprotein cholesterol levels. The Framingham Risk Score algorithm has been available for more than 20 years but no estimates amongst Estonians have been reported so far. The data is also scarce or lacking for CVD risk factors such as apolipoprotein B and A-1, homocysteine, high-sensitive C-reactive protein, fibrinogen and lipoprotein (a), which have been linked to the development of coronary heart disease (CHD) [3–7] and can provide important clinical information, when conventional markers are already taken into account [8].

Additionally, due to genetic, environmental, and cultural factors, people of certain ethnic groups experience a greater burden of CVD [9], a fact that should be also considered in heterogeneous populations such as Estonia. The last study published analyzing connections between CVD risk factors and ethnicity is from 1995 [10]. A new assessment is greatly needed due to the rapid societal changes in Eastern Europe since the beginning of the 1990s. The influences of these changes upon CVD risk are largely unknown.

This is the first comprehensive study about the prevalence of CVD risk factors in Estonia undertaken with the purpose of designing novel future interventions. Our aim was to investigate the prevalence of CVD risk factors and their associations with age, sex and ethnic origin.

2. Materials and methods

2.1. Subjects

The survey sample for the cross-sectional study was drawn in 2007 from the total population in Tallinn (Ministry of the Interior, Government of Estonia). The total population of Estonia is approximately 1.3 million, with ~400,000 living in the capital city of Tallinn. The sample size calculation was based on the protocol of the Countrywide Integrated Noncommunicable Disease Intervention (CINDI) program [11]. Stratified random sampling was used: 200 individuals from each of the sex and age group (20–29, 30–39, 40–49, 50–59, and 60–65 years of age) were randomly selected and invited to participate by mail with up to two follow-up letters sent to non-respondents.

The response rate was 55% for men and 64% for women being the lowest at 20–29 years of age. Initially the sample consisted of a total of 1184 participants, including 545 men and 639 women. Thirty-four men and thirty-nine women were excluded because their laboratory results were not available. Thus the final study consisted of 1111 participants: 511 men and 600 women with an average age of 45.8 ± 12.2 years (range 20–65 years). Participants were questioned about smoking status (daily, ex-smoker, how many cigarettes per day), pregnancy status, physician-diagnosed type 2 diabetes mellitus, hypertension and hypercholesterolemia. Additionally awareness about high blood pressure or elevated cholesterol was identified.

The data and blood samples were collected and analyzed during 2007–2009. All the participants were examined by one trained cardiologist. Blood was collected by one qualified nurse and analyzed by one qualified technician. The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1983.

2.2. Physiological measurements

Blood pressure was measured two times using a mercury sphygmomanometer on the right upper arm while the participant was seated and resting for a minimum of 5 min. Results were recorded to the nearest 2 mmHg. The mean values of both readings were used for the analysis.

The body mass (weight) of participants was measured without shoes and heavy outer garments and then recorded to the nearest 100 g. Height was recorded to the nearest 0.5 cm. Body mass index (BMI) was calculated as the weight in kilograms divided by the height in meters squared [BMI = body mass (kg)/height (m^2)].

Waist circumference (WC) was determined with a tape measure and recorded to the nearest 0.5 cm at a point midway between the costal margin and iliac crest along the midaxillary line.

2.3. Blood sample collection and analysis

Blood sample collection description and laboratory methods are specifically described elsewhere [12]. Shortly all blood samples were obtained after an overnight fast, while the participant was seated. Sample collection from the *vena cubitalis* was carried out using a standard method with Vacutainer tubes (BD Vacutainer, Belliver Industrial Estate, Plymouth; Becton, Dickinson and Co., UK). Serum and plasma were separated by centrifugation and kept at 4 °C until analysis.

All measurements were determined using the standard procedures with Roche reagents (Roche Diagnostics, Mannheim, Germany) on a Cobas analyzer (Roche Diagnostics, Indianapolis, USA or Mannheim Germany). Fibrinogen was determined with an STA Compact auto analyzer (Diagnostica Stago, S.A.S. France) using the Clauss method.

2.4. Diagnostic criteria

A Framingham risk score (10-year CHD risk) was calculated for each participant based on Wilson et al. [13]. Participants were

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