ORIGINAL RESEARCH

National Prevalence of Self-Reported Coronary Heart Disease and Chronic Stable Angina Pectoris

Factor Analysis of the Underlying Cardiometabolic Risk Factors in the Fourth Round of the SuRFNCD-2011

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ABSTRACT

Background: Coronary heart disease (CHD) is one of the most common causes of mortality worldwide. The national prevalence remains unclear in most of the developing countries.

Objective: This study sought to estimate national prevalence of self-reported CHD and chronic stable angina pectoris in the general adult population of Iran using data from the fourth round of the Surveillance of Risk Factors of Non-Communicable Diseases (SuRFNCD-2011) survey.

Methods: The analysis comprised data of 11,867 civilian, nonhospitalized and noninstitutionalized residents ages 6 to 70 years of age. The calculated prevalence of self-reported CHD and chronic stable angina pectoris were extrapolated to the Iranian adult population who were >20 years old using the complex sample analysis. The factor analysis was performed for clustering of the associated cardiometabolic risk factors among people ages >40 years of age.

Results: The estimated national prevalence of self-reported CHD and chronic stable angina pectoris were 5.3% (95% confidence interval: 4.6 to 5.9) and 7.7% (95% confidence interval: 4.6 to 8.7), respectively. Higher prevalence of these conditions were observed among the older people, urban residents, and women. Factor analysis generated 4 distinct factors that were mainly indicators of dyslipidemia, hypertension, central obesity, hyperglycemia, and tobacco smoking. The factor incorporating hypertension was a significant correlate of self-reported CHD.

Conclusions: We report concerning prevalence of self-reported CHD and chronic stable angina pectoris in the adult population of Iran. The constellation of raised systolic and diastolic blood pressures was significantly predictive of the presence of self-reported CHD.

Coronary heart disease (CHD) is the single largest cause of death in the developed countries and is one of the leading causes of disease burden in the developing nations [1]. In 2013, there were in the excess of 54 million deaths reported globally, with 32% of these deaths (around 17 million) being attributable to cardiovascular disease; the majority of these deaths due to cardiovascular disease were attributable to CHD and cerebrovascular disease [2]. At least 350,000 deaths occur per annum in Iran, with the rough estimate of 70,000 deaths from this total figure suggested to be caused by CHD [3]. By comparison, CHD alone caused an estimated 1 of every 7 deaths (14%) in the United States for a total of 375,295 Americans in the year 2011 [4]. As of now, no data from national or subnational levels have been provided for estimating the prevalence of CHD or chronic stable angina pectoris in Iran.

CHD results from the interaction of different genetic and environmental factors that are yet to be completely understood [5,6]. A cluster of cardiometabolic risk factors has been attributed to the development of arteriosclerosis and CHD, namely the components of central obesity, hyperglycemia, dyslipidemia, and hypertension, the combination of which is characterized as metabolic syndrome [7-9]. The prevalence of these risk factors has been shown to be rising in recent years in Iran [10,11]. However, the true contributions of these cardiometabolic risk factors in the development/progression of CHD are controversial and diverse among different ethnic groups and nationalities [12,13].

Started in 2005 and conducted since periodically in 2007 and 2011, the Surveillance of Risk Factors of Non-Communicable Diseases (SuRFNCD) is a nationwide survey of noncommunicable diseases and their associated risk factors among the Iranian adult population. In 2011, estimating the national prevalence of self-reported CHD and chronic stable angina pectoris became possible by asking direct questions associated with these conditions on the clinical study questionnaire. Addition of new itemized questions on the self-reported diagnosis of CHD and angina pectoris allows for tracking the ongoing secular changes in their prevalence over the long term.

In the present study, data from the fourth round of the SuRFNCD (SuRFNCD-2011) was accessed, aggregated, and analyzed to estimate the national prevalence of self-reported CHD and chronic stable angina pectoris in the civilian, nonhospitalized, and noninstitutionalized adult population of Iran. The contribution of different demographic, anthropometric, and biochemical factors to the prevalent self-diagnosed cases of CHD and angina pectoris were carefully investigated using the factor analysis. Factor analysis has been shown to be an appropriate statistical approach for distinguishing particular groups of risk factors that may lead the better understanding of underlying disease processes [14].

METHODS

Sampling protocol of SuRFNCD-2011

A randomized multistage cluster sampling framework was conceived to choose a representative sample of civilian, nonhospitalized, and noninstitutionalized Iranian individuals ages 6 to 70 years. Individuals residing in army bases or nursing homes or those hospitalized during the course of interview were not included. By using a 4-step sampling scheme, 11,867 individuals were surveyed between May 22 and June 20, 2011, in each of the 30 provinces of the country.

Step 1. A total of 402 counties across the country were listed individually or as an assemblage of neighboring counties to designate 50 primary sampling units (PSUs) based on the probability proportional to size algorithm. For this purpose, a consecutive list of potential PSUs and their corresponding cumulative population size was complied. To select the PSU, the sampling interval was first calculated by dividing the population by 50, which is the number of PSUs required. Then, a random number between 1 and the calculated sampling interval was generated. The unit where this random number fell was assigned as the first PSU. Subsequently, succeeding PSU were determined by adding the constant sampling interval.

Step 2. Within the territory of a selected PSU, individual urban and rural areas were designated as potential secondary sampling units (SSU). These potential SSU found a list, from which the 12 required SSU were selected using the probability proportional to size method as previously described.

Step 3. For each of the SSU identified in the step 2, a list of households referenced by their postal addresses (10-digit postal codes; framework provided by the Iranian Postal Service) was conceived. Twenty households were then selected using a simple random sampling method. In case of a selected postal code belonging to a commercial unit, the adjacent household to the right of the commercial unit was used as the alternative. Each address was then contacted and the inhabitants were registered in the survey.

Step 4. For each of the households selected in the step 3, 2 individuals, 1 younger and 1 older than 50 years of age, were drawn from the World Health Organization (WHO) Kish [15] tables (http://www.who.int/healthinfo/survey/whslongversion-appendices.pdf, accessed December 25, 2016), and they were visited at their respective households. After 3 attempts, if a sampling individual was not available or refused to participate, the label "nonresponse" was applied. Cluster sampling was conducted under the direction and supervision of Iran's Center for Disease Control (CDC). The final stage was performed by trained interviewers and was overseen by 43 medical universities across the country. For interviews, a Persian translation of the WHO STEPs Chronic Disease Risk Factor Surveillance (http://www.who.int/chp/steps/instrument/STEPS_Instrument_V3.1.pdf?ua=1, accessed December 25, 2016) was used. At the beginning of each interview, a consent form was read by the interviewer to the interviewee, and acceptance or refusal to participate was formally recorded.

All procedures described herein were conducted in accordance with the guidelines and standards laid down in the current revision of the Declaration of Helsinki. The CDC Board of Ethics approved the study protocol.

The nationwide SuRFNCD-2011 survey had 3 steps: 1) collection of demographics and the associated health-related characteristics; 2) measurement of anthropometrics and clinical metrics; and 3) measurements of biochemical indices. Age, sex, history of diabetes, hypertension, dyslipidemia, chronic stable angina pectoris, and CHD were assessed among the recruited participants.

Physical examinations

In the household visit and following the interview, physical examinations were performed by trained interviewers and included measurement of weight, height, waist circumference, and blood pressure. Weight was measured on a portable digital scale with the participants wearing light clothing and was recorded to the nearest 0.1 kg. An inflexible measurement tape was used to measure height while the individual standing still, with no shoes or socks on, and was recorded with a precision of 0.1 cm. Body mass index (BMI) was calculated as weight (kg) divided by height (m^2). After resting for at least 10 min, 3 blood pressure measurements, 5 min apart, were taken by trained health