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Original Article

Blood glucose and cholesterol levels in adult population of Bangladesh: Results from STEPS 2006 survey



M. Mostafa Zaman ^{a,*}, Sohel Reza Choudhury ^b, Jasimuddin Ahmed ^c,
Md. Habibullah Talukder ^d, A.H.M. Shafiqur Rahman ^e

^a World Health Organization, Dhaka, Bangladesh

^b National Heart Foundation Hospital & Research Institute, Dhaka, Bangladesh

^c Ekhlaspur Center of Health, Chandpur, Bangladesh

^d Bangladesh Cancer Foundation, Dhaka, Bangladesh

^e Zia Heart Foundation Hospital and Research Centre, Dinajpur, Bangladesh

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ABSTRACT

Background: A nationally representative survey was carried out to determine the distribution of blood glucose and cholesterol in adult population of Bangladesh in the absence of existing data.

Methods: The study adopted a multistage and geographically clustered sampling technique of households. A total of 2610 individuals (1444 men and 1166 women) aged 25–64 years were selected from rural and urban areas. Capillary blood glucose and total cholesterol levels were measured using an overnight fasting state.

Results: The mean age of the participants was 41 years [standard deviation (SD), 11 years]. Half of them (49%) were from urban areas. Half of them (51%) had primary or higher education. Mean glucose was 74 mg/dL (SD 23 mg/dL). Men had higher mean glucose levels (79 mg/dL) than women (67 mg/dL). Age-standardized prevalence of diabetes (blood glucose level ≥ 126 mg/dL and/or use of anti-diabetic medication) was 5.5%. In men, it was almost two-and-half times (7.6%) compared with women (2.8%). It was also double in urban areas (7.8%) compared with rural areas (3.4%). Mean cholesterol level among all participants was 167 mg/dL (SD 26 mg/dL). Men and women had almost similar levels (169 mg/dL versus 166 mg/dL, respectively). Prevalence of high cholesterol level (≥ 240 mg/dL) was very low (1.3%) in both men (2.2%) and women (0.5%). However, the prevalence of borderline high cholesterol was substantial (5.8%) in this sample.

Conclusion: The prevalence of high hypercholesterolemia is low, whereas there is a high prevalence of borderline high cholesterol and diabetes in the adult population of Bangladesh. This warrants population-based interventions to tackle this problem.

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* Corresponding author.

E-mail addresses: zamanm@who.int, mmostafazaman@gmail.com (M.M. Zaman), sohel_r_choudhury@hotmail.com (S.R. Choudhury), ahmedjasim1@gmail.com (J. Ahmed), ruskin1963@yahoo.com (M.H. Talukder), shafiqur.torun@yahoo.com (A.H.M. Shafiqur Rahman).
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1. Introduction

Major killer non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes mellitus, chronic respiratory diseases, and some cancers have common amenable risk factors. Therefore, these NCDs can be prevented at first hand by controlling their risk factors.¹ These risk factors are mainly lifestyle-related and include tobacco consumption, unhealthy diet (fatty, salty, and sugary foods, and foods low in fruit and vegetables), low physical activity, and excessive use of alcohol.² Data on these risk factors are largely available because of simplicity of data collection by asking questions only. These lifestyle factors act through a few intervening factors such as obesity, high blood pressure, and high levels of blood glucose and lipids.³ Obesity and blood pressure need physical measurements and they do not require much skill and investment in capital equipment. Therefore, data on these factors also are fairly available even in a developing country like Bangladesh.

The next group of intervening risk factors, however, requires biochemical examination of blood such as glucose and total cholesterol (TC) levels.³ There is insufficiency of data on this group of variables. Some sporadic studies were carried out using small samples in communities in certain corners of Bangladesh.⁴⁻⁶ Studies on blood glucose indicate an increasing trend of diabetes burden in Bangladesh⁷ but cholesterol data are sparse. We reported two small-scale studies^{5,6} from two different villages. Large differences were observed in the cholesterol levels between these two studies. Therefore, there is a need for population-based data on blood glucose and TC level because no such report is available. The present survey was carried out to have a nationally representative data on blood glucose and TC in adults from Bangladesh.

2. Methods

This survey was conducted as per the standardized approach devised by WHO known as STEPS (STEP wise Surveillance) for NCD risk factors in men and women aged 25-64 years.³ The questionnaire was adapted from STEPS.

Ethical clearance was obtained from Bangladesh Medical Research Council (BMRC) and Declaration of Helsinki was followed throughout the study. Written (or thumb impression if unable to write) consent was obtained from the respondents in Bangla as per BMRC guidelines.

2.1. Sample selection

This study used a multistage, geographically clustered, probability-based sample of households, and then individuals. The questionnaire was filled up by interviewers and no proxy interview was allowed. Bangladesh is divided into seven administrative divisions. Out of those seven divisions, Dhaka division is most densely populated because the capital city of Dhaka is located in this division. More than one in ten people of Bangladesh live in Dhaka city alone. Therefore, sample from Dhaka's urban and peri-urban areas was considered mandatory. Out of the remaining six divisions, two (Chittagong and Rajshahi) were randomly selected for rural sample based on

the presence of member organizations of the Alliance for Community-based Surveillance of NCDs.⁸

Diabetes was defined as having blood glucose level ≥ 126 mg/dL⁹ or current medication for diabetes. Borderline high and high cholesterol were defined as 200-239 mg/dL and ≥ 240 mg/dL of TC. Using the prevalence of diabetes (7.5%) for rural-urban combined population, 3% margin of error, and assuming a design effect of 2, the minimum required sample size was 592. This study aimed at giving prevalence data for four categories based on sex and urban-rural areas of residence. Therefore, a minimum of 2369 respondents was needed. Based on a response proportion of 0.8, our sample was inflated to 2961 and ultimately rounded to 3000. Proportionate sub-samples were selected from three divisions (Chittagong, Dhaka, and Rajshahi) to draw this sample of people with eligible ages.

In each area, the field team consisted of one physician and two enumerators. They underwent 3-day training before deployment in the field in the first half of 2006. Random selection of wards in urban areas (in addition to a small sample from a factory setting in peri-urban Dhaka) and unions in rural areas was carried out. In the next step, required number of households was identified in sequential order starting from the first one. Listing of households was carried out if necessary. Finally, one individual per household was recruited using Kish method.¹⁰ People who stayed in the household the night before the day of survey were entered into the roster for identification using Kish table. Sample substitution was not allowed and no repeat call was carried out.

Information on drug treatment of diabetes was also collected. Those who were taking it for last 2 weeks were considered as a documented case of diabetes. WHO STEPS recommended equipment, Acutrend GC, was used to determine glucose and cholesterol by finger pricking without much pressing the fingers. The subjects were on overnight fasting status (8-12 h).³

2.2. Data analysis

Complex survey data analysis was performed to obtain population prevalence or mid-point estimates and their dispersions, as appropriate, for age and sex groups. Separate analyses for urban and rural areas were also carried out. Descriptive statistics was used for presenting all data. Prevalence rates were presented as percentages. Prevalence values were standardized for WHO world standard population.¹¹ All analyses were carried out using SPSS 17.0 version.

3. Results

A total of 2610 (87%) subjects participated. Among the respondents, 1444 (55%) were men (Table 1) with mean age of 41 [standard deviation (SD): 11 years]. Half of them (49%) were from urban areas as stipulated in the study design. Half (51%) of them had primary or higher level of schooling. One-tenth of men were farmers, one-third was laborers (industrial workers, agriculture, and daily laborers), one-tenth was having small business, and one-tenth had jobs in non-government sectors. Nine in ten women were homemakers (data not shown).

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