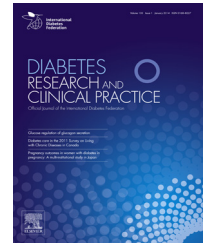




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Diabetes prevalence, awareness and treatment and their correlates in older persons in urban and rural population in the Astana region, Kazakhstan

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ABSTRACT

Aims: The evidence on the prevalence and distribution of diabetes and its determinants in Central Asia is sparse. The aim of the present study was to investigate the prevalence, awareness, treatment, and control of diabetes and factors associated with these characteristics in the population of Astana (capital) city and adjacent rural area in Kazakhstan.

Methods: Participants aged 50–75 years old, residing in Astana city (the capital) and Akmol village were invited to participate in a cross-sectional study. The subjects were randomly selected from polyclinic registers. A total of 953 adults were interviewed (response rate 59%), and their fasting plasma glucose, blood pressure, height and weight were measured. Diabetes was defined as fasting plasma glucose (FPG) ≥ 7.0 mmol/l (126 mg/dl) and/or being on diabetes medication.

Results: The overall prevalence of diabetes was 12.5%, and it was almost twice higher in the urban residents (16.3%) than in the rural population (8.6%). Diabetes prevalence was associated with age, men sex, hypertension, obesity, and Russian ethnicity. Among subjects with diabetes, 72.3% were aware of their condition; 65.6% were on treatment and 27.7% had controlled fasting plasma glucose. The awareness, treatment and control of diabetes were substantially higher in the urban population and among women.

Conclusions: The large differences in all diabetes indices between urban and rural regions, if confirmed in larger studies, may suggest an impact of westernised and urbanised lifestyle as well as access to health care.

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1. Introduction

Diabetes is a serious chronic metabolic disorder and an important modifiable risk factor for cardiovascular diseases. [1] According to WHO, the prevalence of diabetes has been

increasing rapidly over the last decades and at present time the estimated global prevalence of diabetes is around 9%. [2] The International Diabetes Federation projections predict that the prevalence of diabetes will increase to 8.8% by 2035 worldwide [3]. The burden of ill health due to diabetes has also been increasing, primarily in developing world; in 2014,

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diabetes caused 1.5 million deaths worldwide and more than 80% of these deaths occurred in low- and middle-income countries [4].

Most of the research on diabetes and related cardio-metabolic risk factors has been conducted in western countries. There is very little evidence on the situation in Central Asia and Kazakhstan. [5–8] Based on routine statistics, the age-standardized prevalence of diabetes (raised fasting blood glucose ≥ 7.0 mmol/l or on medication for raised blood glucose) in Kazakhstan was estimated as 13.2% [9], which is higher compared to Europe (8.3%) but also higher than in the Russian Federation (9.0%). Similarly, age-standardized mortality from diabetes in Kazakhstan is about double of that in Russia (10.1 vs. 4.5 per 100,000) [9].

A number of risk factors have been found to be associated with the increased risk of diabetes, such as eating behaviours, physical activity and obesity [10], as well as a wide range of socioeconomic factors. [11,12] Many risk factors for non-communicable diseases, including diabetes, are linked with urbanization [13,14], but there is little evidence on the levels of diabetes and related factors in urban and rural populations in Central Asia. The rapid societal transformation after the dissolution of USSR was accompanied by fast introduction of western diet and lifestyle, particularly in urban settings, and growing social and economic differences between urban and rural areas. Providing the evidence on the rates of diabetes and associated factors in these rapidly changing societies is important, since modifying these risk factors may provide many opportunities to prevent diabetes and appropriate management of diabetes reduces diabetes-attributable complications and mortality [15,16].

The aim of the study was to address this evidence gap and to investigate prevalence, awareness, treatment, and control of diabetes and to identify the factors associated with these characteristics in the general population samples of urban and rural areas in the Astana region, Kazakhstan.

2. Materials and Methods

2.1. Study population

We conducted a cross-sectional study in Astana city (the new state capital, population 858,302, population density 1188 persons/km²) and the Akmol village (about 50 km from Astana, population 6,000, population density in the region 7.7 persons/km²) between November 2012 and March 2015.

The study sample was randomly selected (after stratifying for age and 5-year age group) from lists of all inhabitants in the age range 50–74 years (reflecting the overall focus on healthy ageing) who were registered at a local polyclinic (such registration is mandatory in Kazakhstan). Participants were invited by calling their landline telephone; if there was no landline telephone number, then participants were visited at home and invited to participate in the study. A total of 953 of adults aged 50–75 years were recruited (478 in Astana city and 475 in Akmol). The response rate was 59% (56% urban and 63% in rural area). The study protocol was approved by the ethical committee of the Center for Life Sciences, Nazarbayev University, and each participant provided a signed informed consent.

Data were collected during a visit to a polyclinic by standardized questionnaire administered by trained practitioners and a brief physical examination. The questionnaire included an overall assessment of the patient's health, medical history, lifestyle and socio-economic indicators. All questions were translated from English into both Russian and Kazakh languages and back into English to check for accuracy. Blood pressure and anthropometric measures were taken (including height, weight, waist and hip circumference). A venous blood sample was collected.

2.2. Measurements

Diabetes was defined as fasting plasma glucose (FPG) concentration ≥ 7.0 mmol/l (126 mg/dl) or self-reported diabetes medication use; the questionnaire did not specify the type of diabetes (1 or 2). For assessment of FPG, subjects were invited to visit the polyclinic early in the morning after an overnight fast. The fasting status of the subjects was recorded, and those who did not meet the above requirements were invited to visit the polyclinic on another day. Diabetes awareness was assessed by the question whether the subjects had been told by a doctor that they had diabetes. Subjects taking regular hypoglycemic medication or insulin were considered to be on treatment for diabetes. Control of diabetes among those with diabetes was defined as fasting plasma glucose < 7.0 mmol/l (126 mg/dl).

In both Astana city and Akmol village, all blood samples were collected in vacutainers with coagulation activator and serum separation gel. After blood was collected, the tubes were gently shaken up, centrifuged and serum was separated into microtubes. Cooled serum samples were delivered to Astana city, and blood glucose concentration was measured using automatic modular analyzer Cobas 6000, Roche Diagnostics (Germany). We did not use fluoride plasma, since the serum measurements have been shown to be satisfactory [17]. The maximum delay time of the biochemical analysis was no more than 4 hours after blood collection. The minimum fasting period was 8 hours.

Body mass index (BMI) and waist to hip ratio (WHR) were used to assess obesity and abdominal obesity, respectively. BMI was categorized based on WHO classification: normal (BMI 18.5–24.9 kg/m²), overweight (BMI 25–29.9 kg/m²), and obese (BMI over 30 kg/m²). Waist and hip circumferences were measured with one layer of clothes using a standard tape measure. The tape was applied halfway between the costal margin and iliac crest to measure waist, and over the greater trochanter to measure hip. The tape was pulled tight and measurements were taken to the nearest 0.1 cm and recorded. WHR was categorized into two groups based on WHO cut-off points: abdominal obesity is defined as a waist-hip ratio above 0.90 for men and above 0.85 for women. [18]

Prior to blood pressure measurement participants were asked to sit quietly for 5 minutes. Blood pressure was measured three times on the right arm in the sitting position, with a two minute interval between measurements. The average of the second and third measurements was used in the analyses. Hypertension was defined as SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg, and/or the use of antihypertensive medication in the last two weeks.

In addition to age and sex, we used the following socio-demographic characteristics. Urban and rural locations were

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