available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/diabres

Urban rural differences in prevalence of self-reported diabetes in India—The WHO–ICMR Indian NCD risk factor surveillance

Viswanathan Mohan[a,*], *Prashant Mathur*[b], *Raj Deepa*[a], *Mohan Deepa*[a], *D.K. Shukla*[b], *Geetha R. Menon*[b], *Krishnan Anand*[c], *Nimesh G. Desai*[d], *Prashant P. Joshi*[e], *J. Mahanta*[f], *K.R. Thankappan*[g], *Bela Shah*[b]

[a] *Madras Diabetes Research Foundation & Dr.Mohan's Diabetes Specialities Centre, 4 Conran Smith Road, Gopalapuram, Chennai 600 086, India*
[b] *Division of Noncommunicable Diseases, Indian Council of Medical Research, New Delhi, India*
[c] *Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi, India*
[d] *Institute of Human Behaviour and Applied Sciences, Delhi, India*
[e] *Government Medical Colleges & Hospital, Nagpur, India*
[f] *Regional Medical Research Centre, Dibrugarh, India*
[g] *Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, India*

ARTICLE INFO

Article history:
Received 9 March 2007
Accepted 21 November 2007
Published on line 30 January 2008

Keywords:
Self-reported diabetes
Risk factors
India
Surveillance
Urban
Rural
Peri-urban
Non-communicable diseases
Asian Indians
South Asians

ABSTRACT

Recent reports show strikingly high prevalence of diabetes among urban Asian Indians; however, there are very few studies comparing urban, peri-urban and rural prevalence rates of diabetes and their risk factors at the national level. This study is a part of the national non-communicable diseases (NCD) risk factor surveillance conducted in different geographical locations (North, South, East, West/Central) in India between April 2003 and March 2005. A total of 44,523 individuals (age: 15–64 years) inclusive of 15,239 from urban, 15,760 from peri-urban/slum and 13,524 from rural areas were recruited. Major risk factors were studied using modified WHO STEPS approach. Diabetes was diagnosed based on self-reported diabetes diagnosed by a physician. The lowest prevalence of self-reported diabetes was recorded in rural (3.1%) followed by peri-urban/slum (3.2%) and the highest in urban areas (7.3%, odds ratio (OR) for urban areas: 2.48, 95% confidence interval (CI): 2.21–2.79, $p < 0.001$). Urban residents with abdominal obesity and sedentary activity had the highest prevalence of self-reported diabetes (11.3%) while rural residents without abdominal obesity performing vigorous activity had the lowest prevalence (0.7%). In conclusion, this nation-wide NCD risk factor surveillance study shows that the prevalence of self-reported diabetes is higher in urban, intermediate in peri-urban and lowest in rural areas. Urban residence, abdominal obesity and physical inactivity are the risk factors associated with diabetes in this study.

* *Corresponding author*. Tel.: +91 44 2835 9048; fax: +91 44 2835 0935.
E-mail address: drmohans@vsnl.net (V. Mohan).
URL: http://www.drmohansdiabetes.com

0168-8227/$ – see front matter
doi:10.1016/j.diabres.2007.11.018

1. Introduction

Diabetes is a major cause of morbidity and mortality worldwide [1,2]. The problem of diabetes is particularly relevant to India as several studies have clearly documented an increased ethnic susceptibility to diabetes in migrant Asian Indians [3–7]. Recent epidemiological studies have pointed to the growing epidemic of diabetes in India [8–14]. Indeed, according to the recent Diabetes Atlas produced by the International Diabetes Federation (IDF), India is home to the largest number of people with diabetes in the world, 40.9 million diabetic subjects in 2007, and these numbers are predicted to increase to 69.9 million by 2025 [15].

These projections are based on a few isolated studies conducted in specific geographical locations and do not take into consideration the increase in various environmental risk factors, like increasing urbanization and economic development. There is hence an urgent need for a nation-wide surveillance system for non-communicable diseases in general and diabetes in particular. The present study is a collaborative effort of the World Health Organization (WHO) and Indian Council of Medical Research (ICMR) to develop a sustainable system for NCD risk factor surveillance in India using the WHO STEPS approach [16]. This article reports on the risk factors for self-reported diabetes in Indians from the first national NCD surveillance project, which was conducted in India from April 2003 to March 2005.

2. Materials and methods

2.1. Study centers

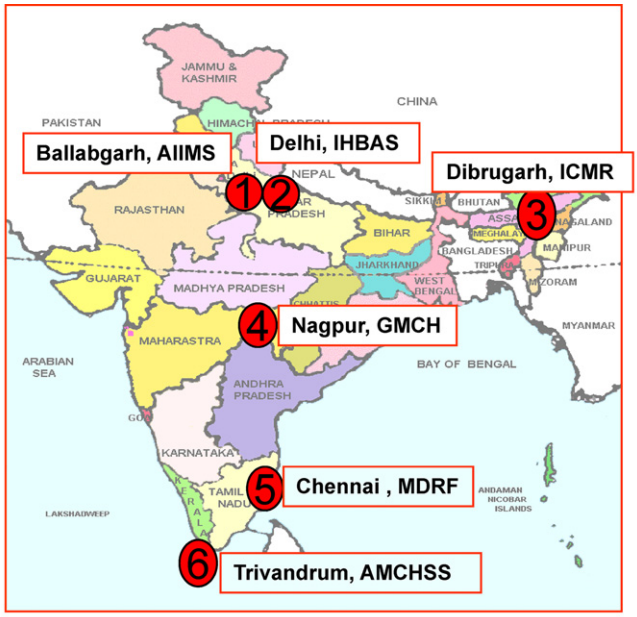
The national NCD risk factor surveillance was conducted in six different geographical locations (East, South, North, West/Central India) in India (Fig. 1). The centers were selected based on the experience of the investigator in conducting studies on NCDs, location of the center and institutional infrastructure for long-term involvement in NCD surveillance.

2.2. Recruitment

Sample size was calculated using the means of the risk factors. The WHO STEPS recommends surveillance of the population aged 25–64. However, as exposure to risk factors start in younger ages in India, the age group was chosen as 15–64 years [17].

2.3. Sampling units

Each state in the country is divided into wards based on geographical location by the Government of India. The existing ward in the sampling areas was used as the primary sampling unit in the urban and peri-urban/slum areas. For the rural areas, the primary health centre (PHC) was selected randomly from one district at each stage, and the village was selected as the primary sampling unit for data collection.



Study centres:

1. Comprehensive Rural Health Services Project, All India Institute of Medical Sciences [AIIMS], Ballabgarh (North)
2. Institute of Human Behaviour and Applied Sciences [IHBAS], Delhi (North)
3. Regional Medical Research Centre, Indian Council of Medical Research [ICMR], NE Region, Dibrugarh (East)
4. Government Medical Colleges & Hospital [GMCH], Nagpur (Central)
5. Madras Diabetes Research Foundation [MDRF], Chennai (South)
6. Achutha Menon Centre for Health Science studies[AMCHSS], Sri Chitra Tirunal Institute of Medical Sciences and Technolo Trivandrum (South)

Fig. 1 – Indian national NCD risk factor surveillance study centers.