

Life Style Intervention on Prevalence of Diabetes Mellitus Among Rural and Urban Population of Ballari, Karnataka

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Received 17 January 2019 ; Accepted 20 February 2019 ; Published on 13 March 2019

Abstract Diabetes mellitus is an heterogeneous disorder with episodes of hyperglycaemia and glucose intolerance, as a result of lack of insulin, defective insulin action, or both. The debilitating effects of diabetes mellitus include various organ failures and progressive metabolic complications. Life style management is apparently the cornerstone of management of this disease. For the present study 700 households were selected randomly and the questionnaire was distributed to collect the required information from family members. The result revealed that 138 and 131 male and female individuals in 137 rural families and 324 and 271 male and female individuals from urban areas were found to be affected. Among the total population 15.79% were found to be affected with diabetes mellitus both from rural and urban areas. The present assessment further indicates that urban population affected more compared to rural population. This paper explores the possible causative factors for diabetes mellitus like history, economic burden, food habits and genetical background in the study area.

Keywords Consanguinity, Pedigree analysis, Diabetes mellitus, Epidemiological survey.

Introduction

Diabetes is emerging as one of the most important public health problems of the 21st century. It is the fast gaining the status of a potential epidemic in India with more than 62 million individuals are currently diagnosed with this disease (Joshi and Parikh 2007). Hyperglycemia and diabetes are important causes of mortality and morbidity, through both direct clinical sequel and increased mortality from cardiovascular and kidney diseases. The prevalence of non-insulin dependent diabetes mellitus has increased dramatically over past decades. Type I is usually characterized by the presence of anti-GAD, islet cell or insulin antibodies which identify the autoimmune process that leads to beta cell destruction (ACT Department of Health and Community Care 1996). Type 2 is a long term metabolic disorder that is characterized by high blood sugar. In the past, type 2 was rarely seen in the young individuals, hence its original name of “adult-onset diabetes”. It is dramatically increases as a result of changes in human behavior and increased body mass index (Elmer et al. 2004). It is also mediated by both genetic and intrauterine environmental factors (Seshiah et al. 2008). Most patients with this form of diabetes frequently go undiagnosed for many years (American Diabetes Association 2010). According to Wild et al. (2004) the prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. The aetiology of diabetes in India is multifactorial and includes genetic factors coupled with environmental influences such as obesity associated with rising living standards, steady urban migration, and lifestyle changes (Au and Rattigan 2012, Gulliford et

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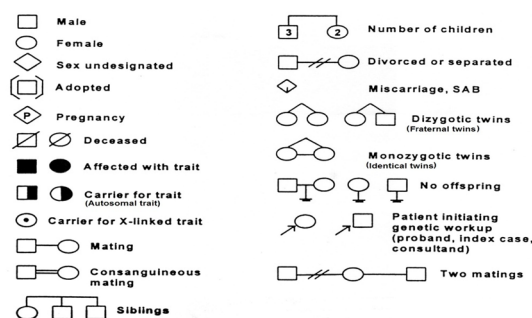


Fig. 1. The chart representing the symbols of a pedigree.

al. 2004, WHO 1985). Diabetes mellitus is emerged as an important health problem in industrialized countries due to alcohol intake, tobacco smoking, spicy foods, life style changes and severe medical treatment and associated diseases such as vascular, cardiac, glomerelosis, albinuria, ulcer, IBS, zellinger elision syndrome, skin rashes, delayed wound healing, muscle weakness, hypertension, retinopathy, atherosclerotic, hyper lipidemic and fibrinolysis (Nagaraja and Mohan 2015). Hence the present study was undertaken to assess the prevalence of diabetes mellitus in and around Ballari city, Karnataka.

Materials and Methods

Bellary, officially Ballari, in the eponymous Bellary district, is a major city in the state of Karnataka, India. It is 311 km from the state capital of Bangalore and 358 km from Hyderabad. Bellary is located at 15.15°N, 76.93°E. It has an average elevation of 495 meters (1,624 ft). The city stands in the midst of a wide, level plain of black cotton soil. Granite rocks and hills form a prominent feature of Bellary.

Table 1. Total household surveyed in rural and urban area of Ballari.

Total population		Population	Total families surveyed	Family affected	Affected individuals	%
Rural (11777)	Male	5995	350	137	138	2.3
	Female	5782			131	2.2
Urban (10509)	Male	5587	350	227	324	5.79
	Female	4922			271	5.5
	Total	22286			700	364

For the present study 700 households were selected randomly and the questionnaire was distributed to collect the required information from volunteers or family members. For this study, a specific genetic registry was designed maintained to register and record the details of the volunteering members and their families assessed during the random survey. By defining the study purpose, the information like family history structure, socio-economic status, physically identifiable quantitative traits, and consanguinity were collected and assessed the pattern of inheritance of identified disorders. Also the volunteers were observed for the presence or absence of several quantitative traits like food habits, smoking, alcoholic habits, tobacco use and any other recognized characters. The questionnaire was translated into the local language according to standard procedures for translation and back-translation and pilot tested in the population studied. The survey was conducted both in the morning and evening to ensure compliance. Where houses were locked, no information could be obtained. In other houses, there were non-responders due to refusal of the volunteers.

Pedigree analysis

A pedigree analysis is a graphical representation of a family tree that is used to determine the mode of inheritance of genetic diseases. The diagram uses symbols to represent people and lines to represent genetic relationships which usually make it easier to visualize relationship within families, particularly in large extended families. The pedigree was constructed using online progeny software (Fig. 1).

Results and Discussion

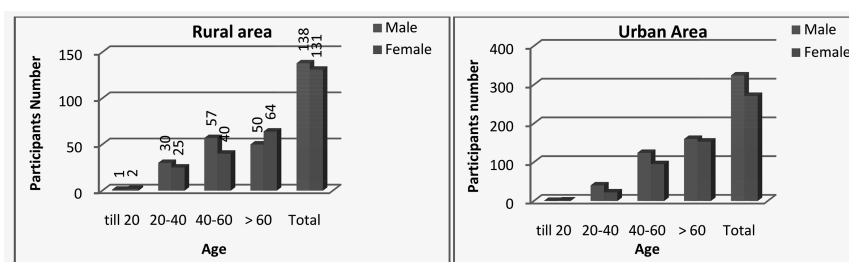


Fig. 2. Age wise affected individuals in rural and urban area.

Diabetes is a group of disorders with common features, of which a raised blood glucose is the most evident. Existing WHO diagnostic criteria for diabetes are being revised following recommendations by a WHO Consultation Group (1998). The ADA has also suggested a revision (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus 1997).

In the present study a total of 700 households were randomly selected from rural (Allipur village) and urban areas (Kuvempu Nagara, Tilak Nagar, Sudha Cross and Cowl Bazar) of Ballari City, Karnataka. 700 households comprise a total of 22,286 population, among which 11,777 comes under rural area and 10,509 were in urban area. Total 350 family members were selected for the studies from both rural and urban areas. Among them 137 and 227 families were said to be affected with diabetes mellitus from the rural and urban areas respectively. Further, the results indicated that 138 and 131 male and female individuals were directly affected from the rural area. Whereas, in the urban area a total of 324 and 271 male and female individuals were found to be affected. Among the total population (22,286) selected for the present study, 15.79% were found to be affected with diabetes mellitus both from rural and urban areas. The present assessment further clearly indicated that urban population were said to be affected more (5.79% male and 5.5% female) compared to rural population (2.3% male and 2.2% female) and males were affected more than females (Table 1).

The comparative analysis of population affected in both urban and rural areas based on the age are shown in the Figs. 2 and 3. It is clearly indicated that male population in urban area were found to be af-

ected more number followed by females in the same area and a fluctuation in numbers under rural area. The prevalence of diabetes is more pronounced from lower age (20 and <20 age to higher age (60 and >60 age). However, among the rural male population the numbers showed fluctuation between 40 and 60 age groups. Among the age groups, the least affected population were found below 40 age and higher affected group found to be the population of 60 and >60 age.

The pedigree analysis of the population surveyed indicated that the autosomal recessive trait was found to be affected the urban and rural population (86 and 171) and it might be transferred from the recessive parent side. Whereas, the dominant autosomal traits affected 41 and 66 number of people in rural and urban areas respectively. In the present study it is clearly indicated that recessive characters responsible for transmission of the disease which was found to be more in urban area followed by rural areas (Fig. 4). In the present investigation it is also asserted that among 350 families in both urban and rural areas, there were 40 and 22 families are consanguinity and other 310 and 328 were non-consanguinity. It can also

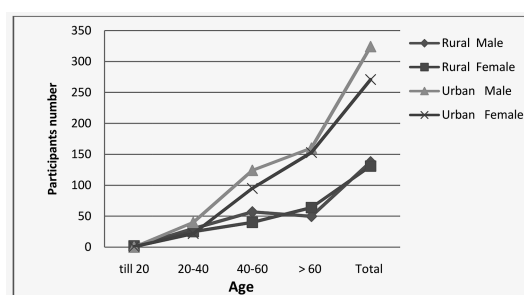


Fig. 3. Comparative age wise affected individuals in both rural and urban areas.

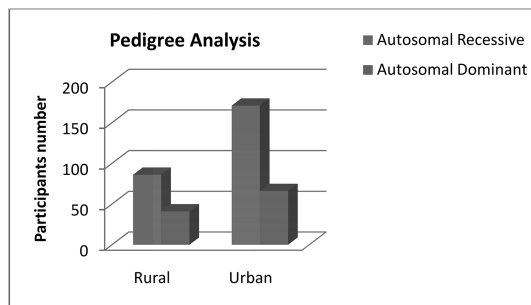


Fig. 4. Pedigree analysis of affected individuals in urban and rural areas.

be predicted further that the consanguinity could be reason for the prevalence of diabetes in more rural population than urban. It can be also predicted that other driving forces like alcohol intake, smoking and tobacco chewing influenced on increase of type II diabetes in both rural and urban population. In the results the urban populations were found to be more addicted to alcohol (250 families) than rural (180 families). Whereas, smoking and tobacco chewing habit were found more in rural area (300 and 320 families) than urban (230 and 210 families). The epidemiological survey on risk of diabetes indicates certain health issues in rural and urban population. The health issues related to diabetes are gastrointestinal problems, eye problem, thyroid related issues, cardiovascular problems and certain nerves disorders were found in the population affected with diabetes. As many as 75 patients visiting diabetes clinics reported had significant gastrointestinal symptoms and other health related issues. The magnitude of the effect on prevalence is likely to differ between groups of different ethnic origin (Unwin et al. 1998). Impaired glucose tolerance has long been recognized as a risk factor for ischaemic heart disease and in some people, it is a precursor of type 2 diabetes. The many conditions that may cause secondary diabetes include pancreatitis, hemochromatosis, endocrine disorders including hyperthyroidism, Cushing's disease and acromegaly, and genetic conditions including cystic fibrosis, Down syndrome and some forms of muscular dystrophy, Diabetic foot and urinary tract infection (Lipsky et al. 2004, Mokabberi and Ravakhah 2007). Scott M Montgomery(2002, Sui et al. (2013 stated that smoking at age 16 is a true risk factor for early

adult onset diabetes. They further suggested that smoking during pregnancy may represent another important determinant of metabolic dysregulation and type 2 diabetes in offspring. The Prevalence of Diabetes in India Study (Sadikot et al. 2004) reported diabetes prevalence of 5.9% and 2.7% in small towns and rural areas respectively. Ezenwaka et al. (2004) stated type 2 diabetes mellitus impacted by both genetic and environmental components.

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