



A study on diabetic type 2 prevalence among urban population compared with rural population of Warangal and Adjoining Districts of Telangana

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ABSTRACT

A study on diabetic type 2 prevalence among urban population compared with rural population from Warangal and Adjoining Districts of Telangana. The aim of this study was to empirically validate a conceptual framework and elucidate the pathways linking social determinants of health to outcomes in individuals with type 2 diabetes. A cross sectional study was carried out from different places of Telangana region, Study included Approximately 200 adults. The model was estimated using path analysis to determine if socioeconomic (education, employment, income) and psychosocial (fatalism, self-efficacy, depression, diabetes distress, serious psychological distress, social support, and perceived stress) factors would independently predict glycemic control or be associated with mediator/moderators of self-care, access to care, and processes of care. Covariates were gender, age, and race and health literacy. Total of 200 subjects was included in the study 100(n) from urban population and 100(n) rural population. Diabetic prevalence was more prone in urban then rural. This study provides the first validation of a conceptual framework for the relationship between socioeconomic and psychological components of social determinants of health and diabetes outcomes.

Keywords: Conceptual framework, Diabetes epidemic, Glycemic control, Psychological, Social determinants, Socioeconomic, Type 2 diabetes.

INTRODUCTION

Diabetes mellitus (DM), is commonly referred to as **diabetes** which is a metabolic disease. Diabetes mellitus is a condition in which the amount of glucose in the blood (blood sugar) is too high. The process of moving glucose from the blood into the body's cells relies on a hormone called insulin. Insulin is released by the pancreas, a gland lying behind the stomach. Insulin helps glucose to enter cells, for example, in muscles, liver and fat tissue. When insulin levels are too low or are ineffective, blood glucose levels can raise, which may result in diabetes. There are two main types of diabetes, type 1 and type 2.

Type 2 diabetes is known as non-insulin dependent diabetes (NIDDM). Insulin is produced, but the muscles that would normally respond by taking up glucose to use as energy storage become insulin resistant, causing glucose levels in the blood to increase. Type 2 diabetes, formerly called adult-onset diabetes, is the most common type of

diabetes. About 95 percent of people with diabetes have type 2. People can develop type 2 diabetes at any age, even during childhood. However, this type of diabetes develops most often in middle-aged and older people. People who are overweight and inactive are also more likely to develop type 2 diabetes. Recently, however, it has escalated in all age groups and is now being diagnosed in younger and younger patients including obese adolescents and children.

Mechanism:

Diabetes among type 2 show excess sugar in blood as well as the urine. Diabetes is a disorder of metabolism. The way the body uses digested food for energy. The digestive tract breaks down carbohydrates, sugars and starches found in many foods into glucose, a form of sugar that enters the bloodstream. With the help of the hormone insulin, cells throughout the body absorb glucose and use it for energy. Diabetes develops when the body doesn't make enough insulin or is not able to use insulin effectively, or both.

Short-term complication - a very high blood (sugar) glucose level: This is not common with type 2 diabetes. It is more common in untreated type 1 diabetes when a very high level of glucose can develop quickly. However, a very high glucose level develops in some people with untreated type 2 diabetes. A very high blood level of glucose can cause lack of fluid in the body (dehydration), drowsiness and serious illness which can be life-threatening

Long-term complications: If blood glucose level is higher than normal over a long period of time, it can gradually damage your blood vessels. This can occur even if the glucose level is not very high above the normal level. This may lead to some of the following complications (often years after you first develop diabetes):

- Furring or hardening of the arteries (atheroma). This can cause problems such as angina, heart attacks, stroke and poor circulation.
- Kidney damage which sometimes develops into kidney failure.
- Eye problems which can affect vision (due to damage to the small arteries of the retina at the back of the eye).
- Nerve damage.
- Foot problems (due to poor circulation and nerve damage).
- Impotence (again due to poor circulation and nerve damage).
- Other rare problems

The primary cause is excessive body weight and not enough exercise. Type 2 diabetes accounts for 90%-95% of diabetes cases and is usually associated with older age, obesity and physical inactivity, family history of type 2 diabetes, or a personal history of gestational diabetes. Type 2 diabetes can be prevented through healthy food choices, physical activity, and weight loss. It can be controlled with these same activities, but insulin or oral medication also may be necessary. Type 2 diabetes begins with insulin resistance, a condition in which cells fail to respond to insulin properly. As the disease progresses a lack of insulin may also develop. This form was referred to as "non insulin-dependent diabetes mellitus" (NIDDM) or "adult-onset diabetes". The primary cause is excessive body weight and not enough exercise.

Type 2 diabetes is due primarily to life style factors and genetics. A number of life style factors are known to be important to the development of type 2 diabetes, including obesity, lack of physical activity, poor diet, stress and urbanization. Most people with type 2 diabetes have two problems: insulin resistance a condition in which muscle,

liver, and fat cells do not use insulin properly and reduced insulin production by the pancreas. As a result, glucose builds up in the blood, overflows into the urine, and passes out of the body, never fulfilling its role as the body's main source of fuel.

Diabetes is the main cause of kidney failure, limb amputation, and new-onset blindness in American adults. People with diabetes are more likely than people without diabetes to develop and die from diseases of the heart and blood vessels, called cardiovascular disease. Adults with diabetes have heart disease death rates about two to four times higher than adults without diabetes, and the risk for stroke is two to four times higher among people with diabetes. Prevention and treatment involve a healthy diet, physical exercise, not using tobacco and being a normal body weight. Blood pressure control and proper foot care also important for with the disease. Dietary changes known to be effective in helping to prevent diabetes include a diet rich in whole grains and fiber, and choosing good fats, such as polyunsaturated fats found in nuts, vegetable oils and fish. Limiting sugary beverages and eating less red meat and other sources of saturated fat can also help in the prevention of diabetes. Active smoking is also associated with an increased risk of diabetes, so smoking cessation can be important preventive measure. Based on above information we had designed a study to elite the important complication regarding the type 2 by conducting a survey and study by following specified questioner and diagnostic methods.

Objectives:

1. To study the prevalence of diabetic 2 in the community by conducting a survey
2. What are the long term and short term impacts among different age groups?
3. To compare and evaluate different diagnostic methods available for rapid detection of type 2.

MATERIALS AND METHODS

Based on the above information we made a survey in Telangana state of different districts were we had included different parameters and specified questioner to counsel the patients and type of treatment, and other infections playing a vital role in decreasing the life time of the person after diabetic type 2 infection.

Study Participants: A cross sectional study and community-based survey of adults of either sex aged ≥ 20 years. A total of 200 people were selected and included in the study; 200 persons (men and women) completed the study. Inclusion criteria were people from both those who live in

urban areas and rural areas. Representative sample of persons 20 years of age or older in the general population were screened for identification of diabetics in the community.

Data Collection

In all study subjects, the following data were collected:

- A structured questionnaire was used to obtain data on demographic and socioeconomic parameters and behavioral aspects, including tobacco use, alcohol use, and physical activity. Complete medical history and family history of diabetes and heart disease were also obtained. In addition, information on diabetes awareness, costs of illness, and health service utilization were also collected. The primary questionnaire was translated into each local language and was administered by trained field interviewers. Questionnaires were validated in 100 subjects and retested after 5 weeks, and the correlation analyses revealed good reproducibility.
- Anthropometric parameters were measured as follows:
 - Height (in centimeters) was measured for all the subjects, subject was asked to stand upright without shoes with his/her back against the vertical back board, heels together and eyes directed forward.
 - Weight (in kilograms) was measured with an electronic weighing scale, that was kept on a firm horizontal flat surface. Subjects were asked to wear light clothing, and weight was recorded to the nearest 0.5 kg.
 - Body mass index was calculated using the formula weight in kilograms/height in meters squared.
 - Waist circumference was measured using a non-stretchable measuring tape. Subjects were asked to stand erect with both feet together. One layer of clothing was accepted. Waist circumference was measured at the smallest horizontal girth between the costal margins and the iliac crest at the end of expiration.
- Blood pressure was recorded in the sitting position in the right arm to the nearest 1 mmHg. Two readings were taken 5 minutes apart and their mean was taken as the blood pressure.
- Fasting capillary blood glucose was first determined using a glucose meter .oral glucose tolerance test (OGTT) was done using a 82.5 g oral glucose load (equivalent to 75 g of anhydrous glucose) and the 2 h post

load capillary blood glucose was estimated. In subjects with self-reported diabetes, only fasting capillary blood glucose was measured.

- A separate “diabetes questionnaire” was used that included questions on duration of diabetes, medication use, self-monitoring of blood glucose, and complications, if any.
- An ECG was carried out for suspected patients.
- Fasting venous sample was drawn for serum lipids and creatinine, as well as for glycated hemoglobin (HbA1c).

Risk factors: Indians seem to be at higher risk for diabetes. Apart from the conventional risk factors propelled by urbanization, industrialization, globalization and aging, other factors may also contribute. It has been proposed that obesity, regional adiposity, higher percentage body fat, early life influences including foetal programming and genetic factors contribute to increased risk. The variables independently associated with diabetes in adults include age, BMI, WHR, income and family history of diabetes. Similarly, body fat percentage (greater than 25% in males and 30% in females), waist circumference (more than 80 cm in females and 90 cm in males) and increased waist: height ratio (≥ 0.58), is associated with increased risk of diabetes in Indian population. Though type 2 diabetes usually manifests clinically in adults, risk factors start getting established even in childhood. Obesity and overweight are emerging as important public health problems, with a reported prevalence between 20-30% in urban socio-economically advantaged school going children. Metabolic abnormalities, including dysglycaemia (about 10%) and dyslipidaemia (25-40%), has been reported in apparently healthy obese or overweight children. To diagnosis the type 2 there are different methods available based on the symptoms. If patient blood glucose (sugar) level remains high then considered as diabetes. If the level goes too low then as hypoglycaemia. We had collected urine, blood for testing the percentage of glucose levels in the body.

Urine test for glucose: Urine (produced by the kidneys) does not normally contain glucose. The kidneys filter our blood, keeping substances the body needs while getting rid of waste products. Your kidneys constantly reabsorb glucose so that it doesn't enter your urine. However, if the blood glucose level goes above a certain level, the kidneys can't reabsorb all of the glucose. This means that some glucose will 'spill' through the kidneys into the urine.

A simple dipstick test can detect glucose in a sample of urine. Colour changes on the strip show whether there is glucose in the urine sample. If you

patient have glucose in your urine, patient will be considered to be diabetes. Urine test to be followed by blood test for confirmation of diabetes. Some people may have kidneys that are more 'leaky', and glucose may leak into urine with a normal blood level due to which glucose may find in the urine
Blood tests for glucose

Random blood glucose level: A sample of blood taken at any time can be a useful test if diabetes is suspected. A level of 11.1 m mol/L or more in the blood sample indicates that you have diabetes. A fasting blood glucose test may be done to confirm the diagnosis.

Fasting blood glucose level: A glucose level below 11.1 m mol/L on a random blood sample does not rule out diabetes. A blood test taken in the morning before you eat anything is a more accurate test. Do not eat or drink anything except water for 8-10 hours before a fasting blood glucose test. A level of 7.0 m mol/L or more indicates that you have diabetes.

If patient have no symptoms of diabetes (see the separate leaflet called Type 2 Diabetes) but the blood test shows a glucose level of 7.0 m mol/L or more then the blood test must be repeated to confirm you have diabetes. If you do have symptoms and the blood test shows a glucose level of 7.0 m mol/L or more then the test does not need to be repeated.

Oral glucose tolerance test: This test may be done if the diagnosis of diabetes is in doubt. For this test, you fast overnight. In the morning you are given a drink which contains 75 g of glucose. A blood sample is taken two hours later. Normally, your body should be able to deal with the glucose and your blood level should not go too high. A glucose level of 11.1 m mol/L or more in the blood sample taken after two hours indicates that you have diabetes.

Home monitoring: A drop of blood from a finger prick is placed on a test strip which has a chemical impregnated which reacts with glucose. By using a colour chart or a small glucose meter machine, the blood level of glucose can be measured quickly.

The HbA1c blood test: The test for diabetes had included with are HbA1c level it will be done for every 2-6 months. This test measures your recent average blood glucose level. The test measures a part of the red blood cells. Glucose in the blood attaches to part of the red blood cells. This part can be measured and gives a good indication of patient's average blood glucose over the previous 2-3 months. HbA1c test is now recommended test

to diagnose diabetes. An HbA1c value of 48 m mol/mol (6.5%) or above is recommended as the blood level for diagnosing diabetes.

Data Analysis: All data collected were stored electronically. The following fields linked all records: name, date of birth, and individual study identification number. The prevalence of diabetes according to age, sex, urban or rural residence, and level of economic development in the general population of persons 20 years of age or older were recorded. All statistical analyses were performed using. Preliminary descriptive analysis was conducted to check for the distribution of the variables of interest, and log transformation was carried out where data were not normally distributed.

RESULTS AND DISCUSSION

A standard questionnaire was administered during the study and collected information on demographic characteristics, personal and family medical history, and lifestyle risk factors. The interview included questions related to the diagnosis and treatment of diabetes, hypertension, dyslipidemia, and cardiovascular events. Cigarette smoking, alcohol consumption. Regular leisure-time physical activity was defined as participation in moderate or vigorous activity for 30 minutes or more per day at least 3 days a week. Socioeconomic status, educational level, occupation, and income were also recorded. Blood pressure, body weight, height, and waist circumference were measured with the use of standard methods, as described previously. Other infections and diseases constantly encountered by the subjects. Out of 200 tested 100(n) from rural and 100(n) from urban we found prevalence of diabetic 2 was more in urban then rural population. Off 200 inclusions 100 (50%) were females and as per our questionnaire we found there was less administration of physical excises and had more prone to Urinary tract infections and hypertension then males. Food habits and physical excises had influenced more in urban population then rural for rapid development of prediabetes to diabetics. 100 (50%) were not reported for testing HbA1c blood test but which can be included in roué ten testing protocol along with Urine test and blood glucose there is need even test The HbA1c blood test which will support the patient to find the status of diabetes and past 2-6 months history of the patients to maintain the blood glucose levels.

Huizinga MM, et al (2006) and Haffner SM et al (1998) indicate that diabetes has reached epidemic proportions in the general adult population. Overall, 92.4 million adults 20 years of age or older

(9.7% of the adult population) have diabetes, and in 60.7% of these cases, the diabetes is undiagnosed. In addition, 148.2 million adults (15.5%) have prediabetes, which is an important risk factor for the development of overt diabetes and cardiovascular disease. These findings, which are based on a large population-based study involving a nationally representative sample of Chinese adults, should provide an accurate estimate of the diabetes and prediabetes burden in China. In addition, the diagnosis of diabetes was established on the basis of both fasting plasma glucose levels and 2-hour plasma glucose levels in an oral glucose-tolerance test, and these measurements were obtained with the use of stringent quality-control procedures.

Schramm TK *et al* (2008), Brancati FL *et al* (1997), Wild S *et al* (2000), Diabetes increases the risk of microvascular and macrovascular complications and premature death in the general population and results in a huge economic burden for society. Li G, Zhang P (2003) Randomized clinical trials have shown that interventions involving diet and exercise reduce the risk of diabetes among people with prediabetes. Public health measures should be undertaken to mitigate the consequences of new cases of diabetes.

LiG, Zhang P, *et al*(2008); Leeder S, *et al* (2004); Yang G, (2008); reported that Several previous national or regional studies have documented a rapid increase in the prevalence of diabetes in the Chinese adult population. Haffner SM *et al* (1998) reported, oral glucose-tolerance tests were not performed in the entire study population or in a random sample; therefore, the true prevalence of undiagnosed diabetes may have been underestimated. Wild S *et al* (2000) in his study reported that, 46.6% of the cases of undiagnosed diabetes and 70.7% of the cases of prediabetes met the criteria for elevated 2-hour plasma glucose levels in an oral glucose-tolerance test but not the criteria for elevated fasting glucose levels. Qiao and colleagues found that in a pooled analysis of Asian cohorts, more than half the subjects with diabetes had isolated hyperglycemia after glucose loading and three quarters of the subjects with prediabetes had isolated impaired glucose tolerance.

Ko GTC, *et al* (2001); Seeman T, *et al* (2008); Yan LL, *et al* (2006) Even accounting for differences in diagnostic criteria, our study documents a large increase in the prevalence's of previously diagnosed diabetes, previously undiagnosed diabetes, and prediabetes. The aging of the population, urbanization, nutritional changes, and decreasing levels of physical activity, with a

consequent epidemic of obesity, have probably contributed to the rapid increase in the diabetes burden in the Chinese population. Future studies are needed to examine the relative contributions of individual risk factors to the increased prevalence of diabetes in the Chinese population.

A higher prevalence of diabetes among urban residents than among rural residents has been observed in developing countries throughout the world. Urbanization is associated with changes in lifestyle that lead to physical inactivity, an unhealthful diet, and obesity, all of which have been implicated as contributing factors in the development of diabetes. In our study, both overall obesity and central obesity were strongly associated with increased prevalence of diabetes and prediabetes. In the analysis stratified according to the level of economic development, the prevalence of diabetes was similar between urban residents and rural residents in economically developed regions but differed between these groups in intermediately developed and underdeveloped regions. Our analysis suggests that the level of economic development and associated lifestyle and diet may explain the differences in the prevalence of diabetes between persons who live in urban settings and those who live in rural areas.

Like previous studies, our study showed a significant inverse association between educational level and the prevalence of diabetes. Educational level is a good indicator of socioeconomic status, and a higher educational level has been associated with lower levels of cardiovascular risk factors, such as obesity, dyslipidemia, and hypertension. Our study has several limitations. First, women and urban residents were oversampled, and there was a lower response rate among men than among women. We took these issues into account when we calculated statistical weights. However, the response rate was higher than 80% among men, and potential selection bias due to nonresponse should be minimal. Second, dietary intake and work-related physical activity were not assessed in our study. Therefore, we were not able to determine the association between these factors and the prevalence of diabetes. Third, to ensure comparability across studies, we used the World Health Organization criteria to define diabetes and prediabetes in our study. The relationship of glucose categories to the risk of microvascular and macrovascular diseases, however, has not been extensively examined in the Chinese population.

Reynolds K, *et al.* (2007); and Muntner P, Gu *et al* (2005) in one of study from china, results show that diabetes and prediabetes are highly prevalent in the general adult population in China. Given its large

population, China may bear a higher diabetes-related burden than any other country. More troublesome is the finding that the majority of cases of diabetes are undiagnosed. These results indicate that diabetes has become a major public health challenge in China and underscore the need for national strategies aimed at the prevention, detection, and treatment of diabetes in the general Chinese population.

CONCLUSIONS

In conclusion, the past decades have witnessed a rapid rise in the prevalence of diabetes, especially in the urban areas. The fact that there is a shift in

age of onset to younger age groups is alarming as this could have adverse effects on the nation's economy. Hence, the early identification of at risk individuals and appropriate intervention in the form of weight reduction, changes in dietary habits and increased physical activity could greatly help to prevent, or at least delay the onset of diabetes and thus reduce the burden due to non-communicable diseases in the society.

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