Original Research

Prevalence of Type II diabetes with reference to ageing and gender differences

Authors:
K. Kanagalakshmi
Vivekanandan

Institution:
Assistant professor,
Department of Zoology,
Stella Maris College
(Autonomous) Chennai -86.

Corresponding author:
K. Kanagalakshmi
Vivekanandan

ABSTRACT:

Diabetes, commonly referred as diabetes mellitus, in general describes a group of metabolic diseases that are caused by insulin deficiency. In which the person has high blood glucose level (blood sugar), either due to the insufficient production of insulin, or due to the body's cells does not respond to insulin, or both. As long as the cells cannot take up the available glucose molecules from the blood of patients due to the lack of insulin hormone, it develops the sense of hunger (polyphagia). Kidneys act as a filter and normally reabsorb the blood glucose before it gets excreted in the urine, but when glucose level is high, kidnies cannot reabsorb all of the sugar, hence the excess sugar is dumped into the urine (polyurea). The increased urine production and consequential dehydration leads to the extreme thirst (polydipsia). India being the capital for diabetic world, visible increase of Type 2 diabetes is coupled with increasing age and that imposes a significant burden on the health care system. Hence, this work was therefore designed to assess the gender and age prevalence of type 2 diabetes mellitus (T2DM) patients attending Government Stanley Hospital, Chennai.

Email Id:
nandika30@gmail.com

INTRODUCTION

Diabetes is the fastest growing long term disease that affects millions of people worldwide. Due to the inadequate production of insulin, or the body's cells do not respond properly to insulin, or both. Patients with high blood sugar will typically experience polyuria (frequent urination); they will become increasingly thirsty (polydipsia) and hungry (polyphagia).

Diabetes (diabetes mellitus) is grouped under metabolic disorder due to insulin deficiency. Metabolism refers to a set of anabolism and catabolism by which it yields energy and this energy is utilized for our body growth. During the process of digestion the complex carbohydrates found in our food is broken down into glucose. Glucose is a form of sugar in the blood and it is the principal source of fuel for our body. When the food gets digested, all the carbohydrates present in the food is finally converted into glucose and this glucose is absorbed by the villi and enters into the bloodstream.

Insulin is a hormone that is produced by the Islets of Langerhans of Pancreas. After eating, adequate quantity of insulin released from the pancreas make the cells to take-up the glucose present in our blood, as soon as glucose enters the cells blood-glucose levels drop. If the quantity of glucose in the blood is too elevated (hyperglycaemia), this condition is due to either not producing insulin or producing insulin only a in little quantity or the cells do not respond to the insulin produced. This condition leads to the building up of excess glucose in the blood stream, this excess blood glucose eventually passes out of the body in urine. So, even though the blood has plenty of glucose, the cells are not getting it for their essential energy and growth requirements.

Diabetes is one of the well known metabolic disease that affects millions of people worldwide However, the defense mechanism of our body (immune system) protects us from various infectious agents, rarely attacks our own insulin producing cells in the pancreas

and causes Type 1 diabetes. Type 1 diabetes is thought to be caused by a combination of genetic reasons and environmental factors. The development of Type 2 diabetes is believed strongly due to lifestyle factors, but not everyone with type 2 is overweight. Hence, other than body weight, BMI, there are various factors like alcohol, smoking, stress, genes etc., are linked to it to cause the metabolic disorder namely Diabetes World Health Organization (WHO, 1999).

The 'World 'Epidemiology' surveyed by International Diabetes Federation (IDF) said that 381 millions of people were affected with diabetes in the year 2013. Its prevalence is increasing rapidly, and by 2030, this number is estimated to almost getting double (Wild *et al.,* 2004). Diabetes mellitus occurs throughout the world, but is more common (especially type 2) in the more developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found by 2030. According to the Indian Heart Association (2015), highest number of diabetic population surveyed in India having 109 millions of people affected with diabetes, which is more than 7.1% of India's adult Population.

Ramachandran (2003) reported that the prevalence of diabetes was less in India compared to western countries in 1970's. The terrific increase in the prevalence of diabetes is now estimated in India by International Diabetes Federation (IDF), to be as the number of diabetic patients in India more than doubled from 19 million in 1995 to 40.9 million in 2007. It is projected to increase to 69.9 million by 2025. A recent report made by International Diabetes Federation (IDF) said that, up to 11% of India's urban population and 3% percent of rural population above the age of 15 has diabetes.

According to WHO (2003) the prevalence of diabetes varies from country to country, state to state, races and ethnic groups. Hence, it is important to quantify the prevalence of diabetes and the number of

people affected by diabetes for national planning and allocation of resources in future. Utmost diabetic population is now found to be in India is mainly due to rapid cultural and social changes, ageing populations, increasing urbanization, dietary changes, reduced physical activity and other unhealthy lifestyle and behavioral patterns. Beckles and Thompson-Reid (2001) reported that the more prevalence of diabetes in female is justified, because of the impact of gestational diabetes on both the mother and baby regarding the increased risk of developing type 2 diabetes in later life.

This work was therefore designed to assess the gender and age prevalence of type 2 diabetes mellitus (T2DM) on the patient attending Government Stanley Hospital, Chennai. This is mostly catering to the needy people who are socially backward with low income and uneducated from the rural and urban areas of Chennai city.

MATERIALS AND METHODS

The participants the diabetic patients attending Government Stanley Hospital, Chennai, India. Service catering to the deprived and needy people are extended even to the far distance patients who visits this hospital. Permission to examine the patients and record their personal data was obtained from the concerned authorities of the Hospital.

Selection of the study area was primarily due to more number of patients from all category of life to visit the Government Stanley Hospital - this initiated the study; moreover, it is was one of the oldest and well known medical centres in India. The hospital has an out-patient attendance of around 5000 patients per day in which more than 150 are visiting the diabetes department with the proportion of 10 to 15% new patients with 1 to 2% of Type 1 diabetic patients. Thus, it is anticipated that the study population would yield an adequate blend of individuals who falls on various age and socio-economic criteria, so that the impact of Type 2 diabetes

and their prevalence with reference to ageing and gender could be scrutinized. The study conducted with a sum of 485 individuals attending Diabetes department, Government Stanley Hospital, who were randomly selected and the study was conducted for two years.

Study design

A survey was conducted based on the questionnaire provided among the participants. Persons who reached hospital at 7 am were met personally and the questionnaire was presented to them to collect information regarding their socio-economic condition such as age, height, weight, waist circumference, hip circumference, waist and hip ratio annual income, duration of diabetes, family history of diabetes, veg/non-veg eater active worker, moderate worker, sedentary worker, ex-alcoholic, current alcoholic nonalcoholic, ex-smoker, current smoker, never, exercise, cardiac problem, eye problem, hypertension.

The second part of the present research work consists of the clinical data collection after the examination of patient's samples.

RESULTS

Percentage distribution of type 2 diabetes male and female with different age group

Observations showed that the diabetic patients were visiting in massive number throughout the year with the blend of Type 1 diabetes, Type 2 diabetes, Gestational diabetes and a set of new patients. Among these patients, female population was found to be more in occurrence throughout the year in the present study.

Patients were reaching the hospital at 7.30 a.m. from faraway places in and around Chennai, they were wait for the Doctor's arrival, a questionnaire was given to them personally to gather information. Observations made from continuous two years of study showed that percentage population of female Type 2 diabetes (61%) was higher than that of male (39%) (Fig

1).

Type 2 diabetes mellitus showed an increasing trend with reference to ageing. It was also observed among the patients that the incidence of this disease was started with the age group of 25. Among the age group intervals, the patients showed their highest incidence of this disease belongs to 40 - 50 and 50 - 60 in both the gender and the prevalence of diabetes at this age group (40 - 50, 50 - 60) was found to be 10%,13% for male and 20%, 20% for female respectively. The results also revealed the decline in the percentage occurrence of diabetes in male (7%, 3%) and female (12%, 1%) in the age group of 60 - 70 and 70 - 80. It is further recorded from the present study that there is no trace of patients attending at the age group above 80 (Fig - 1).

DISCUSSION

The oldest and one of the well known Medical health care centers in India is Stanley Medical College and Hospitals, Chennai. This institution was sown as early as 1740 by the East India Company. The well known departments of the Stanley Medical Hospitals are Surgical Gastroenterology, Urology and the Institute of Hand Rehabilitation and Plastic Surgery. The Department of Diabetology in Government Stanley Medical Hospital started before 50 years. It stood as a pillar in Diabetes care among all Government Hospitals in Tamil Nadu by servicing the people particularly those from the lower socio economic class of society belonging to various places such as Madhavaram, Cholavaram, Minjur, Ponneri, Kavarapettai and Gummidipoondi because of the care and commitment by professionals trained in Diabetes working in this Hospital. This hospital records a registry of more than 70,000 patients. The hospital receives at least 700 patients every day at the outpatient department, of these, 150 suffer from insulin-dependent Type 1 diabetes.

The metabolic disease that increases an alarming rate all over the globe is Type 2 diabetes (Huizinga and Rothman, 2006). According to WHO (2008), Type 2 diabetes is an incurable, chronic endocrine disorder characterized by insulin resistance, decreased pancreatic beta cell function and elevated hepatic glucose output. Further, hyperglycaemia is the hallmark
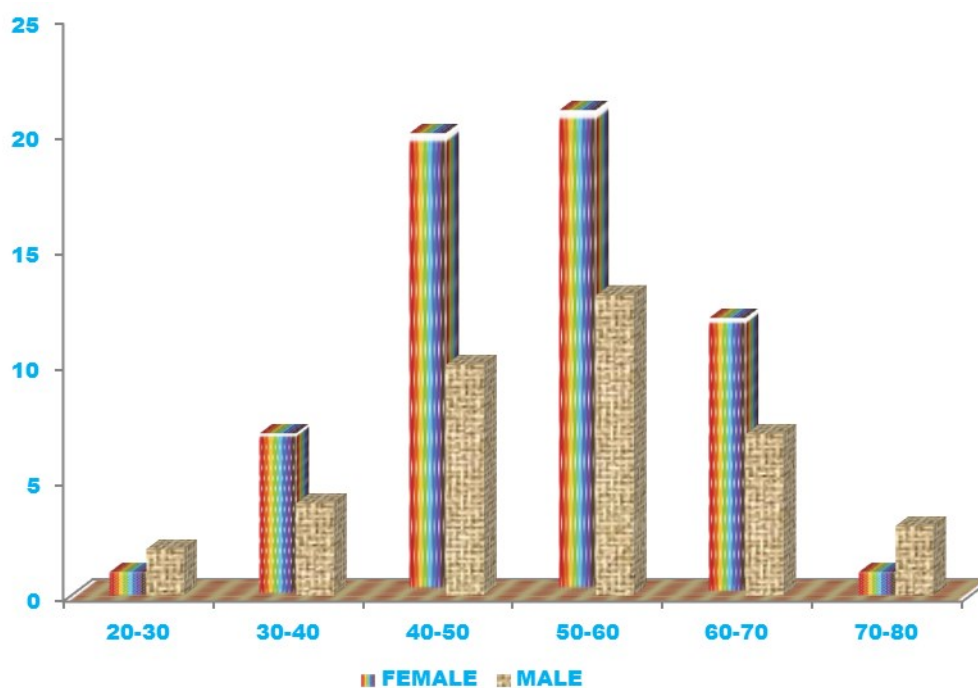

Figure 1. Percentage occurrences of type 2 diabetic male and female of different age group

of diabetes mellitus and common effect of uncontrolled diabetes leads to serious damage to many of the body's systems such as the nerves and blood vessels. In the recent decades the status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting the youth and middle aged people (Wild *et al.,* 2004). World Health Organization (WHO) reports showed that 32 million people had diabetes in the year 2000 (Wild *et al.,* 2004). The International Diabetes Federation (IDF) estimated the total number of diabetic subjects to be around 40.9 million in India and this is further set to rise to 69.9 million by the year 2025 (Sicree *et al.,*2006).

The present observation showed that the higher risk of developing Type 2 diabetes at the age group of 25 invariably, from both the gender due to their food habits, life style, unawareness, stress in the study population. Whereas in developed countries, the diabetes affects the people between the age of 45 and 64 years with predominantly Caucasian populations; most people with diabetes are older than 65 years (Cockram and Chan, 1999).

Females have shown to have over representation in their visit to the hospital regularly when compared to men and this might be due to their abnormal BMI, obesity, unawareness, lack of exercise etc., and mostly men who are attending this hospital for their treatment are fall in the category of heavy manual job for daily wages and these men are either currently alcoholic and smoking or ex- alcoholic and smoking attitude and because of this behavioral attitude they became an easy victims for this incurable disease at their early age.

Ramachandran *et al*., (1988) studies are in consistent with the present results which revealed that in south India there is a female predominance in Indian diabetic subjects due to increased frequency of obesity in females as compared with males. However, few studies have also reported that men are more prone to develop Type 2 diabetes after certain stages of life span (Pan *et*

al., 1997; Kanaya *et al.,*2002; Williams *et al*., 2003 and Amini and Janghorbani, 2007) as compared to women. Likewise a population of biased study conducted in Chennai showed that the prevalence was higher in women 83.3% when compared to men 65.3% (Rajiv *et al.,* 2010). Reports of Cameron *et al.,* (2004) and Ford *et al.,*(2002) showed that in Turkey, India, Iran, African Americans, Mexican Americans etc. women were much more frequently affected, whereas the metabolic syndrome in France and Australia was found to be more common among men (Cameron *et al.,* 2004).

The present study showed that the occurrence of this disease starts at the age group of 25, but the prevalence of this disease was more for the people of age group of above 40, which is due to their ageing, food habits, life style, stress and also the beta cells of pancreas starts their apoptosis. There were more female patients of diabetes of age group above 40 attending hospital; it showed the delayed onset of diabetes in the elder generation but in the current generation the onset is ideal with very early part of their life. (Abdul-Ghani *et al.,* 2006) also reported that the most common form of diabetes is Type 2 diabetes. About 90 to 95 percent of people with diabetes have Type 2 diabetes and the alarming increase in Type 2 diabetes is mainly due to increase in life expectancy, genetic reasons, food habits, sedentary life style, hypertension, stress, cholesterol consumption of certain pills and lack of exercise (Abdul-Ghani *et al.,*2006).

The present data's also showed that the patients who were suffering with the consequence of diabetes due to prolonged duration of their disease belong to the elderly age group 60 - 70 and 70 - 80 respectively. During the present research period, on the other hand there was not even a single female patient found attending to the hospital at the age group above 80, it might be due to no attendees to take them to hospital for treatment or checkup.

A similar study conducted on Sweden reports

that the early onset of this disease such as at 15 years affects their both length of life and health status due to debilitating and life-threatening long-term complications (Vibeke *et al.,* 2013). The study conducted in USA, showed the prevalence of diabetes increased across among all age-groups,but adults ≥65 years of age experienced the largest increase in absolute change mainly due to Obesity, as measured by BMI, waist circumference was strongly associated with the increase in diabetes prevalence, especially in adults <65 (Cheung *et al.*, 2008).

Among Asians, Indians showed their highest prevalence of diabetes and their peak prevalence of diabetes was approximately 10 years younger when compared with Chinese and Japanese subjects (Qiao *et al.*, 2003).

The mortality rate was comparatively higher for diabetic individual in all age, sex, race groups. Median life expectancy was eight years lower for diabetic adults aged between 55 - 64 years and 4 years lower for those aged between 65 - 74 years (Ken Gu *et al.,* 1998). However it becomes a challenging task for the elderly people in controlling their glycemic level of Type 2 diabetes and their consequences such as retinopathy (Morisaki *et al.,* 1994), coronary artery disease events and mortality morbidity, uncontrolled glycemic level also affects the quality of life (Laakso, 1996).

CONCLUSION

- The present investigation clearly showed that the diabetes is a metabolic disorder that can affect anybody, despite the fact that diabetes affects the higher income group.

- Females have shown to have over representation in their visit to the hospital regularly when compared to men to check their glycemic level. A female predominance in diabetic subjects is due to increased frequency of obesity in females when compared with males.

- The present study evidence indicates that metabolic disease could be observed right from the age group of 25 in both the gender and may play a critical role in the development and progression of metabolic syndrome in the study group. However the prevalence shows an increasing trend with increasing age group.

REFERENCES

Amini M and Janghorbani M. (2007). Diabetes and impaired Glucose Regulation in First- Degree Relatives of Patient with Type 2 diabetes in Isfahan, Iran: Prevalence and Risk factors. *The Review of Diabetic Studies*, 4(3):169-176

Beckles GLA and Thompson-Reid PE. **(2001).** *Diabetes and women's health across the life stages: a public health perspective*. Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Diabetes Translation.

Cameron AJ, Shaw JE and **Zimmet PZ. (2004)**. The metabolic syndrome: prevalence in worldwide populations. Endocrinology and metabolism clinics of North America. *Metabolic Syndrome.,* 33(1):351-376.

Cheung BMY, Wat NMS and Tso AWK Tam Sm.

Association between raised blood pressure and dysglycemia in Hong Kong Chinese. *Diabetes Care.,* 31(9):1889–1891

Cockram C and Chan J. (1999). The epidemiology of diabetes in the Western Pacific Region (excluding Japan). In Diabetes in the New Millennium. *Turle J, Kaneko T, Osato S, Eds. Sydney, Pot Still Press,* 11–22

Ford ES, Giles WH and Dietz WH. (**2002)**. Prevalence of the metabolic syndrome among US adults. *Journal of the American Medical Association*, 287(3):356 - 359.

Huizinga MM, Rothman RL. (**2006)**. Addressing the diabetes pandemic: A comprehensive approach. *Indian Journal of Medical Research*, 124(5):481-484.

Indian Heart Association Why South Asians Facts Web. 30 April 2015. http://indianheartassociation.org/ why-indians-why-south-asians/overview.

Kanaya AM, Grady D and Barrett-Comor E. (2002). Explaining the Sex Difference in coronary heart disease mortality among patients with Type 2 diabetes mellitus. *Archives of internal medicine,* 162(5):1737-1745.

Ken Gu, Catherine C Cowie and Maureen I Harris. (1998). Mortality in Adults With and Without Diabetes in a National Cohort of the U.S. Population, 1971–1993. *Diabetes Care*, 21(7):1138 - 1145.

Laakso M. (**1996)**. Glycemic control and the risk for coronary heart disease in patients with non-insulin-dependent diabetes mellitus. The Finnish studies. *Annals of internal medicine*, 124(1 pt 2):127–130.

Morisaki N, Watanabe S, Kobayashi J, Kanzaki T, Takahashi K, Yokote K, Tezuka M, Tashiro J, Inadera H and Saito Y. (**1994)**. Diabetic control and progression of retinopathy in elderly patients: Five-year follow-up study. *Journal of the American Geriatrics Society*, 42(2):142–145.

Muhammad A, Abdul-Ghani, Devjit Tripathy, and Ralph A Defronzo. (2006). Contributions of Cell Dysfunction and Insulin Resistance to the Pathogenesis of Impaired Glucose Tolerance and Impaired Fasting Glucose. *Diabetes* care, 29(**5**):1130 - 1139.

Pan XR, Li GW, Hu YM, Wang JX and Yang WY. (1997). Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance: the Da Qing IGT and Diabetes study. *Diabetes Care,* 20 (4):537- 544.

Qiao Q, Hu G, Tuomilehto J, Nakagami T, Balkau B, Borch-Johnsen K, Ramachandran A, Mohan V, Iyer SR, Tominaga M, Kiyohara Y, Kato I, Okubo K, Nagai M, Shibazaki S, Yang Z, Tong Z, Fan Q, Wang B, Chew SK, Tan BY, Heng D, Emmanuel S, Tajima N, Iwamoto Y, Snehalatha C, Vijay V, Kapur A, Dong Y, Nan H, Gao W, Shi H and Fu F. (2003). DECODA Study Group. Age- and sex-specific prevalence of diabetes and impaired glucose regulation in 11 Asian cohorts. *Diabetes Care*, 26(6):1770 - 1780.

Rajiv Raman, Aditi Gupta, Swakshyar S Pal, Suganesware Ganesan, Kadri Venkatesh, Vaitheeswaran Kulothungan and Tarun Sharma. (2010). Prevalence of Metabolic Syndrome and its influence on microvascular complications in the Indican population with Type 2 diabetes Mellitus. Sankara Nethralaya Diabetic Retinopathy Epidemiology and Molecular Genetic Study (SN-DREAMS, report 14). *Diabetology and metabolic syndrome*, 2(1):67.

Ramachandran A, Jali MV, Mohan V, Snehalatha C, and Vishwanathan M. (1988). High prevalence of diabetes in an urban population in south India. *British Medical Journal*, 297(6648):587–590.

Ramachandran A, Snehalatha C, Satyavani K, Sivasankari S and **Vijay V.** (**2003)**. Metabolic syndrome

in urban Asian Indian adults - a population study using modified ATP-III criteria. *Diabetes research and clinical practice*, 60(3):199–204

Sicree R, Shaw J, and Zimmet P. (**2006)**. Diabetes and impaired glucosetolerance. In: Gan D, editor. *Diabetes Atlas. International Diabetes Federation*. 3rd ed. Belgium: *International Diabetes Federation*. 15:103.

Vibeke Sparring, **Lennarth Nyström**, **Rolf Wahlström**, **Pia Maria Jonsson**, **Jan Östman** and **Kristina Burström, 2013**. Diabetes duration and health-related quality of life in individuals with onset of diabetes in the age group 15—34 years – a Swedish population-based study using EQ-5D**.** *BMC Public Health,* 13:377.

WHO 1999. World Health Organization: Definition, Diagnosis and Classification of Diabetes Mellitus and Its Complications: Report of a WHO Consultation. Geneva, World Health Org.

World Health Organization. (2003). Screening for type 2 diabetes. Report of a WHO and IDF meeting. Geneva: World Health Organization.

WHO 2008. World Health Organization. The world health report 2008: primary health care now more than ever. 1.World health – trends. 2.Primary health care – trends. 3.Delivery of health care. 4.Health policy. I.World Health Organization.

Wild S, Roglic G, Green A, Sicree R and King H. Global. (2004). Prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care,* 27: 1047-1053.

Williams JW, Zimmet PZ, Shaw JE, de Courten MP, Cameron AJ, Chitson P, Tuomileh J and Alberti KG. (2003). Gender differences in the prevalence of impaired fasting glycemia and impaired glucose tolerance in Mauritius: does sex matter? *Diabetic medicine: a journal of the British Diabetic Association*, 20:915 - 920.