

Review Study on Prevalence of Type-2 Diabetes and Its Associated Risk Factors

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Abstract

Type 2 diabetes mellitus (T2DM) is a metabolic disorder that is characterized by high blood sugar due to insulin resistance (reduced ability of insulin to stimulate utilization of glucose in the cells of the body system) and also relatively reduced secretion of insulin from the beta cells of pancreas. Obesity, unhealthy dietary habits, sedentary life style and genetic factors are considered as important risk factors in the development of T2DM. Now days it has spread globally and become most serious health problem. India faces several challenges in diabetes management, including a rising prevalence in urban and rural areas. With the rapid socioeconomic changes occurring in the rural areas, the prevalence of Type-2 diabetes are found to increase several fold which contribute largely to early morbidity and mortality among the population. Screening and awareness program among general population as well as diabetic patients has been done by the Government to achieve prevention and better control of diabetes and its complications.

Introduction

Type 2 diabetes mellitus (T2DM) is the commonest form of diabetes affecting more than 90 per cent of the diabetic population worldwide. There is a rapid upsurge in the number of diabetic patients and this explosive growth is noted in both urban and rural areas. The majority of the patients with diabetes in developed countries are above age 64. It is predicted that by 2030, the number of people aged above 64 with diabetes will be around 82 million, of which about 48 million in developing countries. India has the largest diabetic population and it is expected to increase to 174 million in the year 2025. In developing countries, the majority of people with diabetes are in the 45-64 age groups [1]. The prevalence of type 2 diabetes rates continue to increase with increasing number of patients at risk of serious diabetes-related complications. Having diabetes increases the risk of a myocardial infarction two times and the risk of suffering a stroke two to four times and it is also a leading cause of blindness, limb amputation and renal failure. Urbanization is found to be associated with a sedentary lifestyle, higher calorie food intake and stressful condition, which might contribute to the increasing prevalence of diabetes [2]. High blood glucose accounts for 21 per cent of all deaths from ischemic heart disease and 13 per cent of all deaths from stroke worldwide, with 84 per cent of these cardiovascular deaths occurring in low and middle-income countries. It has been reported that Asia is the epicenter of the diabetes epidemic. People in Asia who develop diabetes tend to have lower body mass index (BMI), be younger, suffer longer from the complications of diabetes, and die sooner than people with diabetes in other regions [3].

Prevalence of Type-2 Diabetes and Its Associated Risk Factors

Irrespective of age, global prevalence of diabetes mellitus was estimated to be 2.8 per cent in 2000 and is predicted to be 4.4 per cent in 2030; currently 190 million people around the world suffer from diabetes mellitus with over 330 million predicted to have the condition by 2025 and 366 million by the year 2030. It is predicted that the developing countries will contribute 77.6 per cent of the total number of diabetic patients in the world by the year 2030 [4]. It is well known that hypertension (HTN) and diabetes mellitus (DM) are two common non communicable diseases that are closely linked: one cannot be properly managed without attention to the other. The presence of HTN substantially increases the risk of morbidity from several diseases, particularly cardiovascular diseases and DM. Therefore, targeted screening for identification of risk factors, early detection and timely treatment can significantly reduce morbidity and mortality related to these non communicable diseases [5]. A cross sectional study on the prevalence of diabetes and pre-diabetes in urban slum of Bangalore reported that the prevalence of diabetes and pre-diabetes was 12.33 per cent and 11.57 per cent. Prevalence of diabetes was more among female of diabetes as compared to male. Increasing age, no or less physical activity, overweight and sedentary behavior showed a significant association with prevalence of diabetes & pre-diabetes [6]. It was reported in another study that HTN is present in almost one third of diabetic cases. Among adult Afro-Americans, elevation of blood pressure is significantly higher in individuals with impaired glucose tolerance and diabetics than in non diabetics. The occurrence of HTN in diabetic patients significantly increases the risk of coronary artery disease, mortality and nephropathy [6]. Significantly higher blood pressure (systolic and diastolic) was observed in diabetics compared to non-diabetic participants. The prevalence of HTN among diabetic participants was more than twice that of non diabetic participants. Obesity was also observed to be high among the participants with abnormal glucose metabolism (Both diabetic and IGT), compared to non-diabetic participants. High

association of diabetes with risk factors of diabetes, such as age, obesity, family history and HTN has been observed [4]. In another study, overall prevalence of pre-diabetes among the respondents was found to be 3.5 per cent in comparison to the nationwide ICMR INDIAB study which reported a prevalence of about 8.3 per cent in Tamil Nadu, 12.8 per cent in Maharashtra, 8.1 per cent in Jharkhand and 14.6 per cent in Chandigarh. The risk factors such as waist circumference (more than 35 and 40 inches in females and males respectively), BMI (more than 25), HTN and family history were found to be correlated with pre-diabetes. In this study, out of 400 individuals, 250 had a waist circumference above 35-40 inches accounting for 62.5 per cent, BMI was more than 25 in about 280 individuals (70 per cent), approximately 320 (80 per cent) were hypertensive and familial predisposition was seen in 350 individuals making around 87.5 per cent [7]. In another study increase in age, alcohol intake, family history of diabetes, stress, overweight/obesity and HTN were found to be associated with diabetes [8]. Many studies have also found positive association with family history, HTN and overweight with Diabetes [9]. In India, traditional dietary patterns are being lost as the population adapts to more industrialized and urban food environment. These changes enhance type 2 diabetes risks by increasing body weight and central adiposity. High consumption of alcohol leads to excess caloric intake and obesity, which in turn accelerates propensity for diabetes [10]. Type 2 diabetes mellitus (formerly called non-insulin-dependent or adult-onset) which results from the body's ineffective use of insulin comprises 90 per cent of diabetes cases. Risk factors of diabetes can be categorized as 'metabolic or physiological risk factors'- overweight or obesity, and hyperlipidemia (high levels of fat in the blood) and 'modifiable behavioral risk factors'- unhealthy diet, physical inactivity and the harmful use of tobacco and alcohol [11]. It was observed that 6.4 per cent of respondents had ≥ 126 mg/dl fasting blood glucose level and diabetes influencing factors such as age, waist circumference, hypertension, BMI, smoking habit and total cholesterol have been significantly different in comparison between diabetic and non-diabetic subjects. About one third (32 per cent) of the total (250) participants were frequent alcohol drinkers whereas 1.2 per cent (3/250) of them reported to be ex-drinkers [12]. The prevalence of T2DM was found to be significantly higher among those aged 45-69 years (18.0 per cent), hypertensive (14.3 per cent), obese (14.4 per cent), with family history of DM (11.9 per cent) and those with hypertriglyceridemia (41.4 per cent). No difference was found in prevalence by sex, residence, social group, educational status, smoking and alcohol use. Age group (45-69 years), marital status, hypertension, obesity and family history of DM were found to be the risk factors significantly associated with T2DM in a multivariate regression model [13]. The risk of developing coronary heart disease in hypertensive people was 96 per cent in those without diabetes and 3.23 fold in those with diabetes, the same increasing risk was observed in case of developing stroke (2.24 and 3.73 fold increase, respectively) [14]. A recent study estimated that acutely obese people whose BMI is greater than 40 are prone to T2DM as compared to those obese people whose BMI is in between 30 to 39.5 [15]. Multivariable logistic regression analysis based on Turkish population diabetic patients statistical analysis revealed that blood pressure, depression, anxiety, stress, physical inactivity, income, family history of diabetes and sleeping disturbance were significant risk factors for metabolic glycemic control and contribute to T2DM occurrence and development. A huge number of depressed patients are sickened from high degree of diabetes specific emotional stress [16]. As both hypertension and DM are highly associated with obesity, it is not surprising that their co-existence is particularly common in obese individuals. Both hypertension and DM increase significantly with increasing age and their co-existence is highest in older individuals. Patients with DM more commonly present with isolated systolic hypertension and are more resistant to treatment. The co-existence of DM and hypertension significantly increase the risk for coronary heart

disease, left ventricular hypertrophy, congestive heart failure and stroke compared with either condition alone [17]. It has been observed that maximum number of diabetic patients i.e. 47.00 per cent was normal according to their BMI, ranging between 18.5–22.0. However, it was reported in study, that 24.4 per cent of the diabetic patients were overweight and 5.6 per cent obese, which revealed that obesity plays a role in causing diabetes. It has also been depicted that majority of the diabetic patients i.e. 46.00 per cent had BP in between normal range i.e. less than 120mm Hg and less than 80mm Hg followed by 40.00 per cent who had systolic BP between 120–139mm Hg and diastolic B.P between 80–89mm Hg ranges and were classified as pre-hypertensive. 12.00 per cent were found to be categorized as hypertensive stage 1, having systolic B.P between 140–159mm Hg and diastolic BP between 90–99mm Hg. While 2.00 per cent of the patients were identified as Hypertensive stage 2 as they were having their systolic BP greater than 160mm Hg and diastolic BP greater than 100mm Hg [18]. Prevalence of hypertension in the overweight population was 8.2 per cent and in an obese population were 22.2 per cent and overall 17.7 per cent. Prevalence in developing countries seems to be similar to that European or other developed countries ranging from 10 per cent to 20 per cent among adults. The prevalence of T2DM, hypertension in the obese group of the study population were found to be 20.2 per cent, 22.2 per cent and in the overweight population were 15.5 per cent and 8.2 per cent, respectively. This indicates that the prevalence of T2DM and hypertension increases with increasing weight of the individuals [19]. A cross-sectional study in 10 states in India observed coexistence of DM and hypertension in 20.6 per cent of patients; the prevalence of pre hypertension was observed to be 60.0 per cent [20].

Conclusions

Type 2 diabetes mellitus is one of the most important public health problems in the developed and developing countries. There is rapid increase in prevalence of diabetes in India and other Asian countries. It has been predicted that India will be having maximum number of diabetes cases by year 2025. Increasing age, female gender, family history of diabetes, physical inactivity and central obesity emerged as the major risk factors for diabetes. People having a family history of diabetes mellitus should adapt healthy life-styles from an early age to prevent or retard the development of T2DM as there is a positive association between family history, HTN, obesity and diabetes mellitus onset. Diabetes Mellitus no longer only a disease of the elderly but is one of the major causes of morbidity and mortality affecting youth and middle aged people. Ageing populations, increasing urbanization, dietary changes, reduced physical activity and unhealthy behavior are the rapid cultural and social changes, which causes diabetes mellitus to increase.

Bibliography

1. Valliyot, B., Sreedharan, J., Muttappallymyalil, J. & Valliyot, S. B. (2013). Risk factors of type 2 diabetes mellitus in the rural population of north Kerala, India: a case control study. *Diabetologia Croatica*, 42(1), 33–40.
2. Raghavendra, A. H., Chabra, P., Sharma, A. K. & Madhu, S. V. (2016). Prevalence of Diabetes Mellitus in an Urbanized Village of East Delhi. *Ntl J Community Med.*, 7(4), 302–306.

3. Meiqin Hu, Yi Wan, Lifen Yu, Jing Yuan, Yonghong Ma, Bin Hou, Xun Jiang & Lei Shang (2017). Prevalence, Awareness and Associated Risk Factors of Diabetes among Adults in Xi'an, China. *Scientific Reports*, 7, 1-9.
4. Zaman, F. A. & Borang, A. (2014). Prevalence of diabetes mellitus amongst rural hilly population of North Eastern India and its relationship with associated risk factors and related co-morbidities. *J Nat Sci Biol Med.*, 5(2), 383-388.
5. Meme, N., Amwayi, S., Nganga, Z. & Buregyeya, E. (2015). Prevalence of undiagnosed diabetes and pre-diabetes among hypertensive patients attending Kiambu district hospital, Kenya: A cross sectional study. *Pan Afr Med J.*, 22, 286.
6. Dasappa, H., Fathima, F. N., Prabhakar, R. & Sarin, S. (2015). Prevalence of diabetes and pre-diabetes and assessments of their risk factors in urban slums of Bangalore. *J Family Med Prim Care.*, 4(3), 399-404.
7. Sultana, S. & Kulkarni, P. K. (2016). Prevalence of Pre-diabetes (Impaired fasting glucose and/or impaired glucose tolerance) among urban slum dwellers. *Diabetes Cholest metabol*, 1(1), 10-11.
8. Dev, S., Jain, T., Sivaprakasam, P. & Raja, D. (2017). Risk factor assessment and screening for diabetes infield practice area of a private medical college in Thiruvallur district of Tamil Nadu. *Int J Community Med Public Health.*, 4(8), 2670-2673.
9. Meshram, I. I., Rao, V. V. M., Rao, S. V., Laxmaiah, A. & Polasa, K. (2016). Regional variation in the prevalence of overweight/obesity, hypertension and diabetes and their correlates among the adult rural population in India. *Br J Nutr.*, 115(7), 1265-1272.
10. Barik, A., Mazumdar, S. & Chowdhury, A. (2016). Physiological and behavioral risk factors of type 2 diabetes mellitus in rural India. *BMJ Open Diabetes Research and Care.*, 4(1), e000255.
11. Hu, F. B., Satija, A. & Manson, J. E. (2015). Curbing the diabetes pandemic: the need for global policy solutions. *JAMA.*, 313(23), 2319-2320.
12. Akula, S., Akula, S. & Thota, S. (2019). Prevalence of Diabetes Mellitus and its risk factors. *LAIM.*, 6(3), 319-324.
13. Tripathy, J. P., Thakur, J. S. & Jeet, G. (2017). Prevalence and risk factors of diabetes in a large community-based study in North India: results from a STEPS survey in Punjab, India. *Diabetol Metab Syndr.*, 9, 8.
14. Kaur, H. & Kochar, R. (2019). Impact of Stress Status on Hypertension. *CPQ Nutrition*, 3(2), 01-10.
15. Kaur, H. & Kochar, R. (2017). A study on demographic and socioeconomic profile of diabetic patients. *Int. J. of Adv. Res.*, 5(6), 837-846.
16. Kaur, H. & Kochar, R. (2017). Stress and diabetes mellitus. *Int J Health Sci Res.*, 7(7), 265-272.

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17. Grossman, A. & Grossman, E. (2017). Blood pressure control in type 2 diabetic patients. *Cardiovascular Diabetology*, 16(1), 3.
 18. Kaur, H. (2016). Diabesity and hypertension. *Galore International Journal of Health Sciences & Research*, 1(1), 1-9.
 19. Mandal, A. (2014). Study of prevalence of type 2 diabetes mellitus and hypertension in overweight and obese people. *J Family Med Prim Care.*, 3(1), 25-28.
 20. Kapoor, D., Bhardwaj, A. K., Kumar, D. & Raina, S. K. (2014). Prevalence of Diabetes Mellitus and Its Risk Factors among Permanently Settled Tribal Individuals in Tribal and Urban Areas in Northern State of Sub-Himalayan Region of India. *Int J Chronic Dis.*, 2014, 380597.