SCREENING OF TYPE 2 DIABETES MELLITUS IN KANYAKUMARI GOVERNMENT MEDICAL COLLEGE HOSPITAL AMONG GENERAL POPULATION

Ponnaian John Christopher[1], Brinda[2], Shankar Selvaraj[3], Benitta Mary Redleene[4], Chandrashekar Madhu[5]

[1]Associate Professor, Department of General Medicine, Kanyakumari Government Medical College Hospital.
[2]Assistant Professor, Department of General Medicine, Kanyakumari Government Medical College Hospital.
[3]Assistant Professor, Department of General Medicine, Kanyakumari Government Medical College Hospital.
[4]Postgraduate, Department of General Medicine, Kanyakumari Government Medical College Hospital.
[5]Postgraduate, Department of General Medicine, Kanyakumari Government Medical College Hospital.

ABSTRACT

BACKGROUND

As the diabetes prevalence is increasing worldwide, an impending diabetes "pandemic" has been reported. Complications related with diabetes could be prevented by early diagnosis. This study shows the trends in incidence of diabetes among general population and its association with obesity, hypertension, age and sex.

METHODS

The general population who came to Kanyakumari Government Medical College Hospital (KGMCH) were screened for diabetes and the incidence of newly-diagnosed Diabetes Mellitus (DM) were used for examining the impacts of lifestyle, social and anthropometric features and other risk factors. The target population comprised >30 years old from the general population who came to KGMCH. A standard questionnaire was used for collecting information on sex, blood pressure, weight, height and BMI for each participant. Blood samples were collected for determining RBS and those with RBS >200 mg/dL were further evaluated after 8 hours fasting for the measurement of fasting and postprandial glucose levels.

RESULTS

Diabetes was associated with ageing, male sex, overweight and hypertension. The mean age of the population with high incidence of diabetes is 60±10 years. Males are affected with an average of 30.5% and females 25.13%. 58.15% of newly-diagnosed diabetic males and 59.5% of newly-diagnosed diabetic females were overweight. Among newly-screened hypertensive patients 26.56% of males and 27.2% of females have diabetes. This study suggests that diabetes is a common health problem in this population and showed an increasing trend from April 2013 to March 2016.

CONCLUSION

The study suggests that diabetes and factors associated with its occurrence are common health problems in this region. The high prevalence of DM and considerable rate of newly-diagnosed diabetes signifies the importance of the screening programme in this population.

KEYWORDS

Diabetes Mellitus, Obesity, Body Mass Index, Hypertension.

HOW TO CITE THIS ARTICLE: Christopher PJ, Brinda, Selvaraj S, et al. Screening of type 2 diabetes mellitus in Kanyakumari Government Medical College Hospital among general population. J. Evid. Based Med. Healthc. 2016; 3(75), 4077-4080.
DOI: 10.18410/jebmh/2016/871

INTRODUCTION: Diabetes mellitus is a chronic illness that contributes greatly to overall morbidity and mortality and has been reported to be increasing in prevalence throughout the world.[1] The global burden of diabetes is related to the increase in obesity, decrease in physical activity and the ageing of the population.[2-8] Diabetes is a chronic disease with an indeterminate latent phase that is often asymptomatic and may go undiagnosed. Therefore, screening and detection play a role in how the onset of disease and incidence are defined. Diabetes is associated with long-term dysfunction and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels. Individuals with undiagnosed type 2 diabetes are also at significantly higher risk for coronary heart disease, stroke and peripheral vascular disease than the nondiabetic population. They also have a greater likelihood of having obesity, dyslipidaemia and hypertension. Early detection and prompt treatment may reduce the incidence of diabetes and its complications. Generally, screening in asymptomatic populations is appropriate when seven conditions are met:

1. The disease is an important health problem in the population.
2. The natural history of the disease is known.

Financial or Other, Competing Interest: None.
Submission 22-08-2016, Peer Review 05-09-2016,
Acceptance 12-09-2016, Published 19-09-2016.
Corresponding Author:
Dr. Benitta Mary Redleene,
62B, Allvins, Rajakkamangalam Road,
Ramanputhur, Nagercoil-629002.
E-mail: beniredleene@gmail.com
DOI: 10.18410/jebmh/2016/871

3. There is a preclinical stage during which the disease can be diagnosed.
4. Tests that are available should detect the preclinical stage of the disease; tests should be acceptable and reliable.
5. Treatment after early detection is available.
6. The case finding and treatment costs are reasonable and facilities are available to treat newly-diagnosed cases.
7. Screening will be a systematic ongoing process.

For diabetes, conditions 1 to 4 are met. Conditions 5 to 7 have not been met entirely because there are no randomised clinical trials documenting the effectiveness of screening programs in decreasing mortality and morbidity from diabetes.

Major risk factors for type 2 diabetes:[9,10]

- Family history of diabetes.
- Overweight (BMI ≥25 kg/m2).
- Physical inactivity.
- Previous Impaired Glucose Tolerance.
- Hypertension (≥140/90 mmHg).
- HDL cholesterol ≤35 mg/dL; Triglyceride level ≥250 mg/dL.
- History of Gestational DM.
- Polycystic ovary syndrome.

MATERIALS AND METHODS: Study Subjects: The target population comprised >30 years old general population who came to Kanyakumari Government Medical College Hospital (KGMCH) Non-Communicable Disease (NCD) Outpatient Unit. All individuals were screened in the study with a RBS and those with RBS >200 mg/dL were evaluated further with FBS and PPBS. Table 1.1 shows newly-detected diabetics among general population of KGMCH. A basic questionnaire about anthropometry, sex and blood pressure measurements were done. Fig. 1.1 describes the trends in the incidence of DM among male and female over the period of 3 years from April 2013 to March 2016. Body weight and height were measured and BMI was calculated. Those with BMI >30 were considered as obese.

Table 1.2 shows the association of diabetes mellitus with obesity. Blood pressure was measured twice in a 5 minutes interval in sitting position, after 10 minute rest and the mean was taken in all cases. Both Systolic (SBP) and Diastolic Blood Pressure (DBP) were recorded, which consider individuals with blood pressure ≥140/90 mmHg as hypertensive. Table 1.3 shows the association of diabetes mellitus with hypertension. Newly-diagnosed diabetics were identified based on the WHO criteria[11] as Fasting Blood Sugar (FBS) ≥126 mg/dL and those having fasting blood sugar of ≥110 mg/dL, but <126 mg/dL were defined as having Impaired Fasting Glucose (IFG). Individuals with FBS <110 mg/dL were designated as having normal glucose tolerance. Newly-diagnosed people were referred to the physician for consultation and standard medical care.

RESULTS: The general population screened among aged 30 years and older in 2013-14 consisted of 31558 members and in 2014-15 was 31119 members and in 2015-16 was 24137 members. There were 8143 diabetes cases in 2013-14 when compared to 8231 cases in 2014-15 and 7279 in 2015-16. Trends in the incidence of newly-screened diabetes among general population of KGMCH from 2013-2016 is seen in Fig. 1.2. Annual incidence trends from 2013 to 2016 are presented in Fig. 1.1 and 1.2. Among the previously-screened at-risk population, there was an increase in incidence from 2013 to 2016 with rates of 258/1000, 264.5/1000 and 301.6/1000, respectively. On examining the incidence in males and females, the males showed an increased incidence when compared to females. Males are affected with an average of 30.5% and females 25.13%. Diabetes mellitus was also associated with obesity and hypertension as shown in tables 1.2 and 1.3. 58.15% of newly-diagnosed diabetic males and 59.5% of newly-diagnosed diabetic females were overweight. Among newly-screened hypertensive patients, 26.56% of males and 27.2% of females have diabetes. The age-stratified percentage showed similar trends of a steady and slow increase across the age groups particularly in the >50 age groups. The mean age of the population with high incidence of diabetes is 60+/-10 years. Table 1.4 shows the percentage of newly-screened diabetics among various age groups.

Year	Total Population Screened		Newly Detected Diabetes Mellitus		Diabetes With Hypertension	
	Males	Females	Males	Females	Males	Females
2013-14	13247	18311	3904	4239	2004	1207
2014-15	13453	17666	4129	4102	1789	1678
2015-16	10012	14125	3155	4124	1433	1156

Table 1.1: General Population of KGMCH

BMI	2013-14		2014-15		2015-16	
	Males	Females	Males	Females	Males	Females
<18.5	-	-	-	-	-	-
18.5-24.99	10.08%	11.42%	11.46%	9.95%	9.01%	9.55%
24.99-29.99	59.45%	63.63%	51.56%	49.19%	63.45%	65.68%
> 30	30.47%	24.95%	36.98%	40.86%	27.54%	24.77%

Table 1.2: Association of Diabetes Mellitus with Obesity

Year	Newly Detected Hypertensives		Diabetes With Hypertension		Percentage Of Diabetics Among Hypertensive Patients	
	Males	Females	Males	Females	Males	Females
2013-14	6550	4940	2004	1207	30.5%	24.4%
2014-15	6228	4985	1789	1678	28.7%	33.6%
2015-16	6980	4885	1433	1156	20.5%	23.6%

Table 1.3: Association of Diabetes with Hypertension

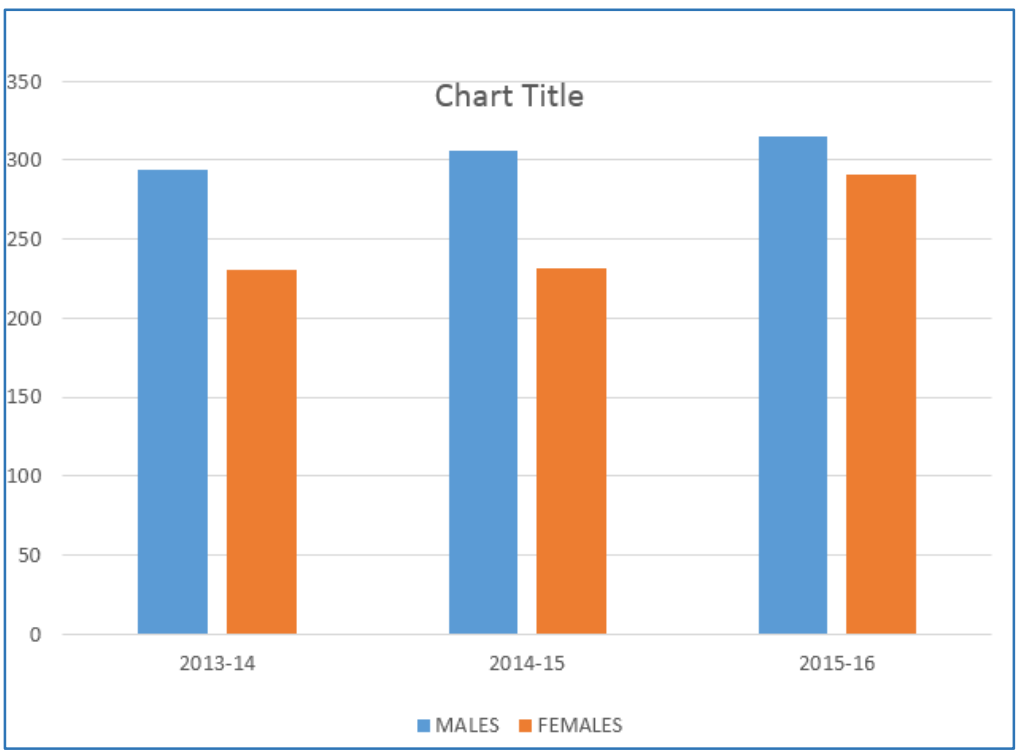

Fig. 1.1: Trends in the Incidence of Newly Screened Diabetics among Males & Females

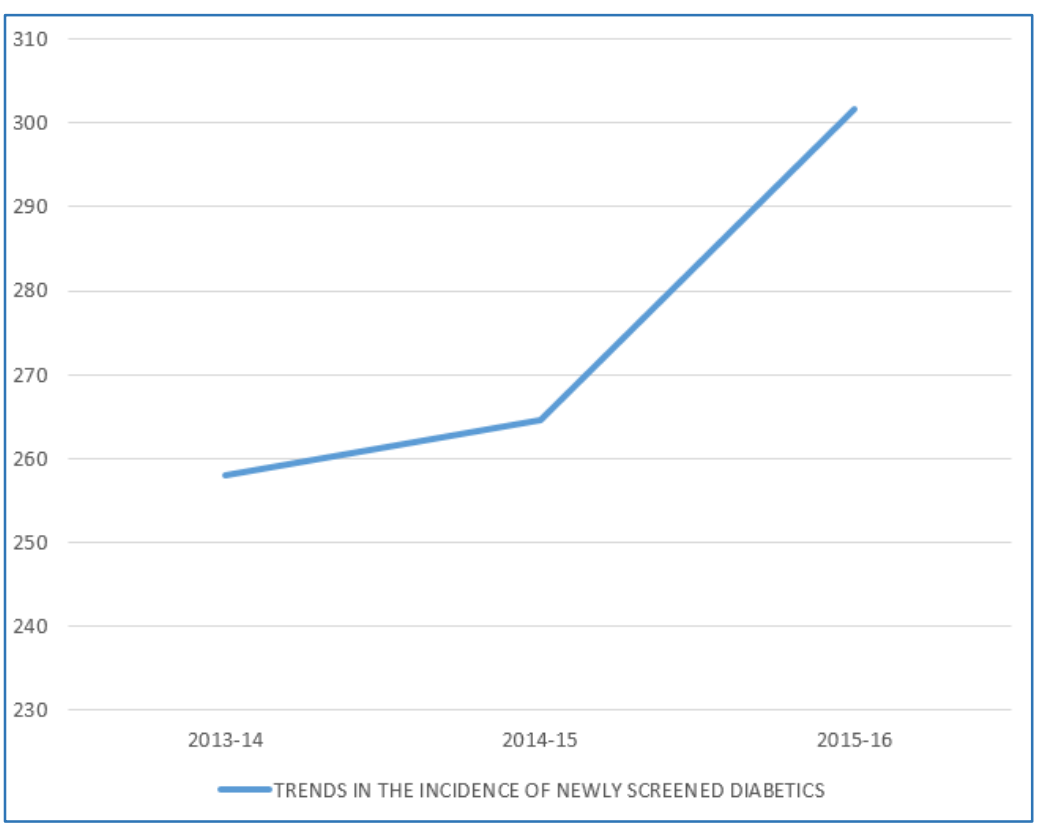

Fig. 1.2: Trends in the Incidence of Newly Screened Diabetics among General Population at KGMCH

	Percentage of DM Among Various Age Groups					
	2013-2014		2014-2015		2015-2016	
AGE	Males	Females	Males	Females	Males	Females
30-40 years	0.82%	0.23%	1.43%	0.41%	1.03%	0.35%
40-50 years	4.61%	3.2%	5.22%	3.5%	4.51%	4.72%
50-60 years	12%	9.11%	10.72%	8.9%	12.66%	12.11%
>60 years	11.24%	9.61%	13.32%	10.31%	13.42%	12.01%
Total	**29.4%**	**23.1%**	**30.6%**	**23.2%**	**31.5%**	**29.1%**

Table 1.4: Percentage of Newly Screened Diabetics among Various Age Groups

DISCUSSION: The aetiology of diabetes is multifactorial, which includes genetic factors, environmental factors like obesity associated with rising living standards, urban migration, lifestyle changes and so on. Obesity is one of the major risk factors for diabetes. India has a higher prevalence of diabetes when compared to western countries suggesting that diabetes may occur even at a lower body mass index in Indians. Moreover, Indians are genetically predisposed to the development of diabetes. Diabetes mellitus is reaching potentially an epidemic proportion in India. Diabetes is now shown to be associated with a spectrum of complications and occurs at a relatively younger age. The morbidity and mortality due to diabetes and its complications are high and produce a significant healthcare burden to the society. Thus, our population is more prone to development of the complications of diabetes when compared to other population. Therefore, diabetes must be carefully screened and monitored regardless of the patient age.

CONCLUSION: The study suggests that diabetes and the risk factors associated with it are common health problems in this population. The high prevalence of DM and the percentage of newly-diagnosed cases signify the role of screening programmes. The available data do not support universal diabetes screening, but some recent reports suggest that screening programmes targeting individuals with diabetes risk factors is necessary to find new cases.[12] With regard to long-term complications, early detection of diabetic cases would shift the focus of diabetes management towards a more preventive one. Primary prevention through lifestyle modifications play a crucial role in the control of diabetes. The results of this study emphasise the need to increase public awareness and lifestyle modification towards healthy nutrition and increased physical activity.

REFERENCES

1. Danaei G, Finucane MM, Lu Y, et al. National, regional, and global trends in fasting plasma glucose and diabetes prevalence since 1980: systematic analysis of health examination surveys and epidemiological studies with 370 country-years and 2.7 million participants. Lancet 2011;378(9785):31-40.
2. Monesi L, Baviera M, Marzona I, et al. Prevalence, incidence and mortality of diagnosed diabetes: evidence from an Italian population-based study. Diabet Med 2012;29(3):385-392.
3. Cowie CC, Rust KF, Ford ES, et al. Full accounting of diabetes and prediabetes in the U.S. population in 1988-1994 and 2005-2006. Diabetes Care 2009;32(2):287-294.
4. Ringborg A, Lindgren P, Martinell M, et al. Prevalence and incidence of Type 2 diabetes and its complications 1996-2003-estimates from a Swedish population-based study. Diabet Med 2008;25(10):1178-1186.
5. Carstensen B, Kristensen JK, Ottosen P, et al. The Danish national diabetes register: trends in incidence, prevalence and mortality. Diabetologia 2008;51(12):2187-2196.
6. Lipscombe LL, Hux JE. Trends in diabetes prevalence, incidence, and mortality in Ontario, Canada 1995-2005: a population-based study. Lancet 2007;369(9563):750-756.
7. Gonzalez EL, Johansson S, Wallander MA, et al. Trends in the prevalence and incidence of diabetes in the UK: 1996-2005. J Epidemiol Community Health 2009;63(4):332-336.
8. Holden SH, Barnett AH, Peters JR, et al. The incidence of type 2 diabetes in the United Kingdom from 1991 to 2010. Diabetes Obes Metab 2013;15(9):844-852.
9. Chan JC, Malik V, Jia W, et al. Diabetes in Asia: epidemiology, risk factors, and pathophysiology. JAMA 2009;301(20):2129-2140.
10. Lyssenko V, Jonsson A, Almgren P, et al. Clinical risk factors, DNA variants, and the development of type 2 diabetes. N Engl J Med 2008;359(21):2220-2232.
11. World Health Organization. Definition, diagnosis 21, and classification of diabetes mellitus and its complications: report of WHO consultation. Part 1: diagnosis and classification of diabetes mellitus. Geneva: World Health Organization 1999:p. 59. (WHO/NCD/NCS/99.2).
12. O'Connor PJ, Rush WA, Cherney LM, et al. Screening for diabetes mellitus in high-risk patients: cost, yield, and acceptability. Eff Clin Pract 2001;4(6):271-277.