International Journal of Community Medicine and Public Health
Geetha A et al. Int J Community Med Public Health. 2017 Nov;4(11):4151-4156
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20174819

Original Research Article

Study on the impact of family history of diabetes among type 2 diabetes mellitus patients in an urban area of Kancheepuram district, Tamil Nadu

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Received: 23 August 2017
Accepted: 18 September 2017

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is a commonly occurring chronic non communicable disease. Family history of diabetes is one of the important non modifiable risk factor for occurrence of the disease. This study was done to assess the percentage of positive family history of diabetes among T2DM patients and its association with age of onset and complications of diabetes.
Methods: This is a descriptive cross sectional study done in an urban health training centre of a medical college. Using purposive sampling technique, 215 diabetic patients were selected as study participants. Data collection was done by structured questionnaire. Data analysis was done using SPSS 17.
Results: Among the study participants, 62.3% were females. The mean age of the participants was 56.08±10.04. Nearly 68.8% of T2DM patients had family history of Diabetes, among them 25.1% of them had diabetic mother and 15.3% had diabetic father. Among the study group of T2DM patients, 51.6% had diabetic complications. The family history of diabetes with age of onset and complications had statistically significant association among the study group.
Conclusions: This study shows that persons with positive family history of diabetes are more prone to early onset of diabetes and developing complications. So appropriate behavioural changes and modification must be practiced to delay or prevent the occurrence of the disease. Early diagnosis and treatment is a must to prevent the complications in the vulnerable people.

Keywords: Age of onset, Diabetic mother, Diabetic father, T2DM

INTRODUCTION

Diabetes mellitus is a metabolic disease which is characterized by elevated levels of blood glucose or blood sugar levels. It is categorized into type 1 diabetes mellitus and type 2 diabetes mellitus. Type 1 diabetes mellitus (T1DM) occurs when the body does not produce enough insulin due to autoimmune destruction of the pancreatic beta cells. Type 2 diabetes mellitus [T2DM] occurs when the body does not produce enough insulin in the later age. Among these two, T2DM is the most commonly occurring disease.[1,2]

There are modifiable and non-modifiable risk factors which lead to development of T2DM. Modifiable risk factors are overweight, obesity, physical inactivity, high blood pressure, etc., while non-modifiable risk factors are age, ethnicity and history of gestational diabetes.[3] Both environmental and genetic factors add to the complex etiology of the disease.[4] As the age advances diabetes can damage the heart, blood vessels, kidneys, eyes and

nerves. The complications of diabetes are diabetic neuropathy, diabetic retinopathy, diabetic nephropathy, peripheral artery disease and coronary artery disease.[5]

According to WHO, 422 million people in the World have diabetes, with a prevalence of 8.5% among the adult population. The prevalence of diabetes has been steadily increasing for the past 3 decades, which is growing rapidly in low and middle income countries. In 2015, the prevalence of diabetes among the Indian population was found to be 8.7%.[6]

Presence of family history of T2DM is well established risk factor for developing the disease.[7] Diabetes is a disease which has a strong clustering in families and has a genetic component.[8] The risk of developing T2DM increases approximately two to four fold when one or both parents are affected.[9,10] If either father or mother have diabetes in the family, it increases the risk by 15%, if both the parents are affected the risk increases by 75%.[11] Having a first degree relative with type 2 diabetes increases the chance of developing diabetes by 40%.[12] Maternal and paternal familial histories are associated with an earlier age of onset and poor glycemic control.[13,14]

Thus, family history of diabetes may be a useful tool to identify the individuals at increased risk of developing the disease and target behaviour modifications that could potentially delay disease onset and improve health outcomes.[15]

Based on this background, this study was carried out with the main objectives of

1. Identifying the percentage of type 2 diabetes mellitus patients with family history of diabetes.
2. Identifying the association between family history of diabetes and age of onset of diabetes.
3. Identifying the association between family history of diabetes and complications of diabetes.

METHODS

Study design

This is a cross sectional descriptive study done in an urban area of Kancheepuram district, Tamil Nadu.

Study area and population

The study was done among type 2 diabetes mellitus patients attending Urban Health Training Center (UHTC), Anakaputhur which is the urban field practice area of our institution in Kancheepuram district of Tamil Nadu.

Study period

The study was carried out between January 2016 and June 2016.

Sample size and sampling technique

Sample size was calculated based on the percentage of family history of diabetes found in a study done by Evuru et al, which showed 66.1% of the study population had a positive family history of diabetes mellitus.[16] Using the formula $4pq/L^2$, with a precision of 10% of the prevalence, the sample size calculated was 205. Adding 5% refusal rate, the calculated sample size was 215. Purposive sampling method was used to carry out the study among T2DM patients attending the urban health training centre based on the following inclusion and exclusion criteria.

Inclusion and exclusion criteria

Patients who have been diagnosed as having T2DM for more than a minimum period of one year were included in the study. Patients who are not willing and those who didn't give informed consent were excluded from the study.

Ethical approval and informed consent

Ethical approval was obtained from the Institutional Ethical Committee. Written informed consent was obtained from the study participants before data collection, after explaining about the objectives of the study.

Data collection

A pretested structured questionnaire was used for data collection. Demographic information including age, occupation, education, marital status and religion were obtained. Along with it history of diabetes in the family, age at onset and complication due to diabetes like diabetic retinopathy, diabetic neuropathy, diabetic nephropathy, coronary artery disease, and peripheral artery disease were also collected.

Data entry and analysis

Data collected were analysed using SPSS software version 17. Results were presented using descriptive and analytical statistics; chi square and p value were calculated to find out the association and odds ratio is used to find out the strength of association.

RESULTS

This study is done among 215 T2DM patients for identifying positive family history, their age of onset of diabetes and complications due to diabetes. The results of the study are as follows:

Mean age of the study participants was 56.08±10.04. Majority of them belong to age group of 41-60 years (57.7%) followed by age group of 61-80 years (34%). Female participants were comparatively higher (62.3%)

than male participants (37.7%). Most of the study participants were literate (81.3%). Most of the participants were Hindus (80.9%). Regarding their employment status, 68.4% were employed and 31.6% were unemployed. Majority of the study participants belong to Class IV socio-economic status (31.2%) followed by class III (26.5%), according to BG Prasad classification of socio-economic status (Table 1).

Table 1: Socio demographic characteristics of the study participants.

S. No	Socio demographic details	Frequency N=215	Percentage (%)
1	**Age**		
	21 – 40 yrs	18	8.4
	41 – 60 yrs	124	57.7
	61 – 80 yrs	73	34.0
2	**Gender**		
	Male	81	37.7
	Female	134	62.3
3	**Education**		
	Illiterate	40	18.6
	Literate	175	81.3
4	**Religion**		
	Hindu	174	80.9
	Muslim	28	13.0
	Christian	13	6.0
5	**Occupation**		
	Employed	147	68.4
	Unemployed	68	31.6
6	**Socioeconomic status- (BG Prasad classification)**		
	Class I	23	10.7
	Class II	42	19.5
	Class III	57	26.5
	Class IV	67	31.2
	Class V	26	12.1

Among the T2DM patients in the study, 68.8% had a positive family history of T2DM and 31.2% had a negative family history (Figure 1). Among the study participants, 51.6% had diabetic complications and 48.4% did not have any complications (Figure 2).

Family history of the study participants with T2DM was enumerated. Among the participants with positive family history of diabetes, 25.1% of them had diabetic mother, 15.3% had diabetic father, 12.1% had both father and mother with diabetes, 47.4% of them had siblings with diabetes and 40% had family history of diabetes among second degree relatives such as grandparents, aunts and uncles (Table 2).

The distribution of age at onset of diabetes and diabetic complication among those with and without family history was enumerated. Among the participants who had age of onset of diabetes within 21-30 years, 90.9% had positive family history. Among the participants who had age of onset of diabetes within 70-80 years, 60% had negative family history of diabetes and only 40% had positive family history of diabetes. Most of the participants who had diabetic retinopathy had positive family history (82.5%). Among the participants with diabetic nephropathy, 77.8% had positive family history. In case of peripheral artery disease, 83.3% had positive family history. Most of the participants who had coronary artery disease had positive family history of diabetes (68.4%) (Table 3).

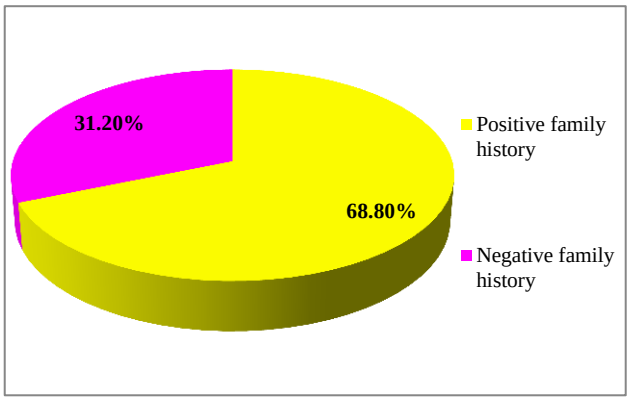

Figure 1: Percentage of study participants with positive family history of diabetes mellitus.

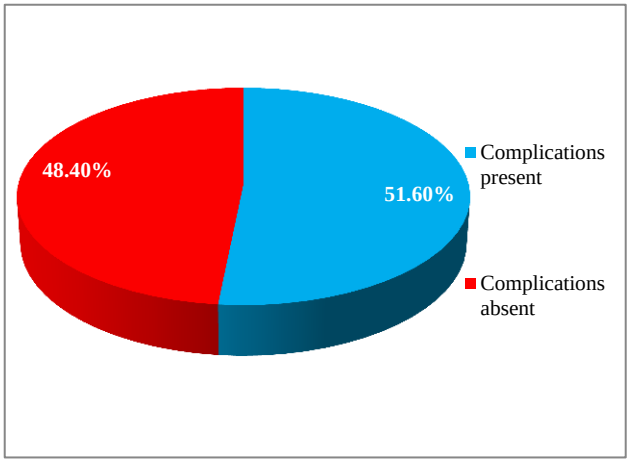

Figure 2: Percentage of the study participants with complications of diabetes.

Table 2: Presence of family history among study participants with T2DM.

S. No	Family history	Frequency	Percentage (%)
1	Mother	54	25.1
2	Father	33	15.3
3	Both parents	26	12.1
4	Siblings	102	47.4
5	Second degree relatives	86	40.0

Table 3: Distribution of age of onset of T2DM and complications among study participants with positive family history.

S. No	Variables	Family history present		Family history absent		Total	
		n = 148	%	n = 67	%	N =215	%
1	**Age at onset of diabetes**						
	21 yrs – 30 yrs	10	90.9	1	9.1	11	5.1
	31 yrs – 40 yrs	29	82.9	6	17.1	35	16.3
	41 yrs – 50 yrs	55	75.3	18	24.7	73	33.9
	51 yrs – 60 yrs	42	59.2	29	40.8	71	33.0
	61 yrs – 70 yrs	10	50	10	50	20	9.3
	71 yrs – 80 yrs	2	40	3	60	5	2.3
2	**Diabetic complications**						
2a.	Diabetic retinopathy						
	Yes	33	82.5	7	17.5	40	18.6
	No	115	65.7	60	34.3	175	81.4
2b.	Diabetic neuropathy						
	Yes	65	74.7	22	25.3	87	40.5
	No	83	64.8	45	67.2	128	59.5
2c.	Diabetic nephropathy						
	Yes	7	77.8	2	22.2	9	4.2
	No	141	68.4	65	31.6	206	95.8
2d.	Peripheral artery disease (PAD)						
	Yes	10	83.3	2	16.7	12	5.6
	No	138	68.0	65	32.0	203	94.4
2e.	Coronary artery disease (CAD)						
	Yes	13	68.4	6	31.6	19	8.8
	No	135	68.9	61	31.1	196	91.2

Table 4: Association between family history of diabetes with age of onset and complications.

S. No	Variables	Family history Present		Family history Absent		Odds Ratio (95% CI)	Chi square	P value
		n = 148	%	n = 67	%			
1	**Age of onset**							
	< 40 years	39	84.8	7	15.2	3.07 (1.29- 7.28)	6.94	0.008*
	≥ 41 years	109	64.5	60	35.5			
2	**Complications**							
	Yes	86	77.5	25	22.5	2.33 (1.29- 4.22)	7.99	0.005*
	No	62	59.6	42	40.4			

*P<0.05 significant at 95% CI.

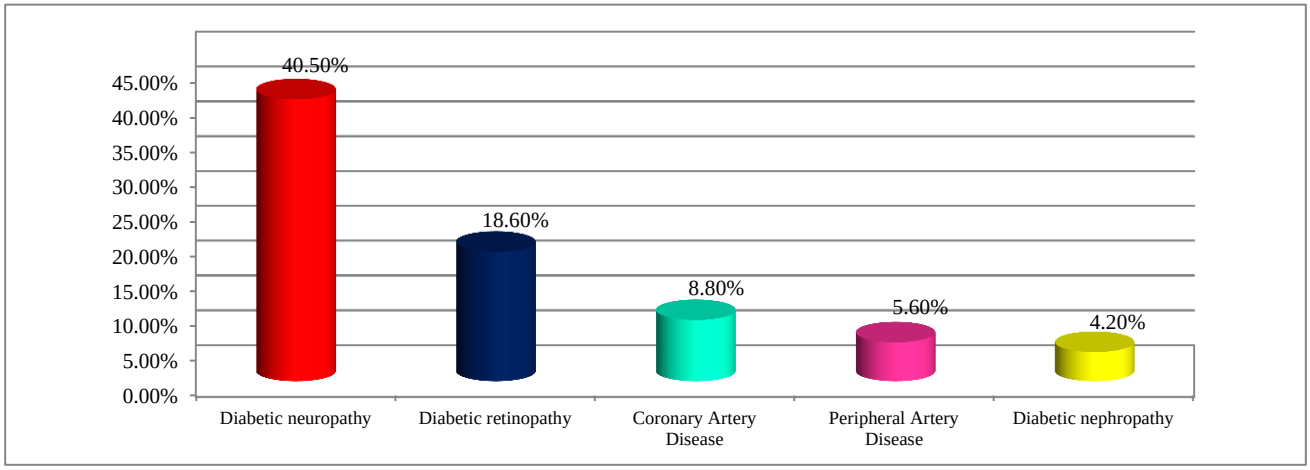

Figure 2: Percentage of diabetic patients with complications among the study participants.

Participants with positive family history had early onset of diabetes (84.8%) when compared with participants with negative family history of diabetes, which was found to be statistically significant ($p<0.05$), with an odds ratio of 3.07 (95% CI–1.29-7.28). Similarly participants who had positive family history are more prone to develop complications (77.5%), when compared with participants with negative family history, which was also statistically significant ($p<0.05$), with an odds ratio of 2.33 (95% CI–1.29-4.22) (Table 4).

The percentage of diabetic complications among the study participants was enumerated. Majority of them had diabetic neuropathy (40.5%), followed by diabetic retinopathy (18.6%), coronary artery disease (8.8%), peripheral artery disease (5.6%) and diabetic nephropathy (4.2%) (Figure 3).

DISCUSSION

Family history of T2DM is one of the most important non modifiable risk factor for developing the disease. To identify the impact of family history of T2DM on the onset, prognosis and outcome of the disease, this study was carried out among 215 Type 2 Diabetes Mellitus patients, which showed varied and interesting findings.

This study showed that 68.8% of the study participants had family history of diabetes. Similar findings were observed in studies done by Evuru et al in Andhra Pradesh and Patel et al in Ahmedabad, which showed positive family history of 66.2% and 67% respectively.[16,17] This shows that family history of diabetes is highly prevalent among type 2 diabetic patients.

The family history of T2DM among the study participants showed that, 25.1% of them had a diabetic mother, 15.3% of them had a diabetic father and 12.1% had both of their parents to be diabetic. These findings were similar to the study done by Evuru et al in Andhra Pradesh in which, 19.4% of the participants had a diabetic father, 23.2% had a diabetic mother and 5.6% had both of their parents to be diabetic.[16] But in a study done by Crispim et al in Brazil, 48.4% of the T2DM patients had diabetic mother and 21.3% had diabetic father.[18] From these studies, it can be concluded that, among the T2DM patients, the prevalence of maternal family history of T2DM were found to be high when compared with paternal family history.

From this study, the T2DM patients who had an early onset of diabetes were found to be high among those with positive family history of T2DM, when compared with those with no family history. This association was also found to be statistically significant. Similar results were found in studies done by Mallikarjun et al in Karnataka and Papazafiropoulou et al done in Piraeus, Greece.[19,20] So among those with positive family history of diabetes, measures have to be taken to have them screened at regular intervals for early onset of T2DM.

Participants with family history of diabetes had early onset of diabetes, which results in early onset of diabetic complications. In this study, participants with positive family history were found to be more prone to develop diabetic complications when compared to participants with negative family history of diabetes. These results were similar to the findings in a study done by Mallikarjun et al in Karnataka.[19] From this, we can conclude that, complications related to T2DM have to be looked out for among those with the positive family history of the disease.

CONCLUSION

This study shows that participants who had a positive family history of T2DM were more prone for early onset of the disease. Those who had an early onset of T2DM were more prone for diabetic complications and associated morbidity. So it can be concluded that positive family history of T2DM plays an important role in the prognosis and outcome of the disease. So, among those with both positive family history and early onset of the disease, measures have to be taken for regular and periodic monitoring of glycemic control, regular ophthalmic examination and assessment of renal functions to look out for any diabetic complications.. Health education pertaining to the lifestyle modifications like diabetic diet, increase in physical activity, foot care and cessation of alcohol and smoking can be advised to them, to reduce or prevent the morbidity due to the disease.

Family history of diabetes can also be used as an important tool for identifying the people at risk of developing the disease. By means of regular screening camps, people with positive family history of diabetes can be identified and health education pertaining to behaviour modifications like proper physical activity, healthy diet and cessation of alcohol and smoking practices can be advised. With the help of these behavioural modifications, the onset of the disease can be delayed and early onset of complications can be prevented.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee, Sree Balaji Medical College and Hospital

REFERENCES

1. World Health Organization. Diabetes. Available at http://www.who.int/diabetes/en/. Accessed on 20 August 2017.
2. World Health Organization. Diabetes fact sheets. Updated July 2017. Available at http://www.who.int

/mediacentre/factsheets/fs312/en/. Accessed on 20 August 2017.
3. American Heart Association. Understand your risk for Diabetes. Available at http://www.heart.org/HEARTORG/Conditions/More/Diabetes/UnderstandYourRiskforDiabetes/Understand-Your-Risk-for-Diabetes_UCM_002034_Article.jsp#.WZxri1UjHIV. Accessed on 20 August 2017.
4. Keku TO, Millikan RC, Martin C, Rahkra-Burris TK, Sandler RS. Family history of colon cancer: what does it mean and how is it useful? Am J Prev Med. 2003;24(2):170-6.
5. World Health Organization. Global report on Diabetes. p13. Available at http://apps.who.int/iris/bitstream/10665/204871/1/9789241565257_eng.pdf. Accessed on 31 July 2017.
6. World Health Organization. World Health Day 2016: Diabetes. Available at http://www.searo.who.int/india/mediacentre/events/2016/en/. Accessed on 18 August 2017.
7. Dhananjayan R, Malati T, Brindha G, Kutala VK. Association of family history of type 2 diabetes mellitus with markers of endothelial dysfunction in South Indian population. Indian J Biochem Biophys. 2013;50(2):93-8.
8. Ramachandran A. Epidemiology of type 2 diabetes in India. J Indian Med Assoc. 2002;100:425–7.
9. Klein BE, Klein R, Moss SE, Cruickshanks KJ. Parental history of diabetes in a population-based study. Diabetes Care. 1996;19(8):827-30.
10. Alcolado JC, Alcolado R. Importance of maternal history of non-insulin dependent diabetic patients. BMJ. 1991;302(6786):1178-80.
11. Diabetes.co.k. Diabetes and genetics. Available at http://www.diabetes.co.uk/diabetes-and-genetics.html. Accessed on 20 August 2017.
12. Vishwanathan M, McCarthy MI, Snehalatha C, et al. Aggregation of type 2 (non-insulin-dependent) diabetes mellitus in South India; Absence of excess maternal transmission. Diabet Med. 1996;13(3):232-7.
13. Moleneaux L, Constantino M, Yue D. Strong family history predicts a younger age of onset for subjects diagnosed with type 2 diabetes. Diabetes Obes Metab. 2004;6(3):187-94.
14. Bo S, Cavallo-Perin P, Gentile L, Repetti E, Pagano G. Influence of a familial history of diabetes on the clinical characteristics of patients with type 2 diabetes mellitus. Diabet Med. 2000;17(7):538-42.
15. Baptiste-Roberts K, Gary TL, Beckles GL, Gregg EW, Owens M, Porterfield D, et al. Family history of diabetes, awareness of risk factors, and health behaviors among African Americans. Am J Public Health. 2007;97(5):907-12.
16. Srikanth E. Familial Aggregation of Type 2 Diabetes Mellitus in Rural India. IJSR. 2015:4(8):41-5.
17. Patel M, Patel IM, Patel YM, Rathi SK. A hospital-based observational study of type 2 diabetic subjects from India. Int J Clin Pract. 2013;24(2):141-8.
18. Crispim D, Canani LH, Gross JL, Tschiedel B, Souto KE, Roisenberg I. Familial history of type 2 diabetes in patients from Southern Brazil and its influence on the clinical characteristics of this disease. Arq Bras Endocrinol Metab. 2006;50(5):862-8.
19. Jali MV, Kambar S, Jali SM, Gowda S. Familial early onset of type-2 diabetes mellitus and its complications. N Am J Med Sci. 2009;1(7):377-80.
20. Papazafiropoulou A, Sotiropoulos A, Skliros E, Kardara M, Kokolaki A, Apostolou O, Pappas S. Familial history of diabetes and clinical characteristics in Greek subjects with type 2 diabetes. BMC Endocr Disord. 2009;9(1):12-8.

Cite this article as: Geetha A, Gopalakrishnan S, Umadevi R. Study on the impact of family history of diabetes among type 2 diabetes mellitus patients in an urban area of Kancheepuram district, Tamil Nadu. Int J Community Med Public Health 2017;4:4151-6.