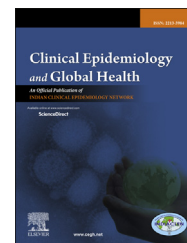




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Student's Section

Parental transmission of type 2 diabetes mellitus among patients attending a tertiary care hospital



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ABSTRACT

Problem considered: Type 2 Diabetes Mellitus is a heritable condition. Some studies suggest a strong maternal association while others claim paternal transmission of diabetes to be more significant. The present study was aimed at identifying the role of parental transmission in Type 2 diabetic patients with family history of diabetes.

Methods: This was a cross-sectional study carried out among individuals diagnosed with Type 2 Diabetes Mellitus (DM) and having a family history of the same attending the General Medicine OPD in a tertiary care hospital. Consenting consecutive patients fulfilling the inclusion criteria were enrolled into the study. Demographic characteristics, age at onset of Type 2 Diabetes and parental history of the disease were obtained in detail.

Results: Of the 174 participants enrolled into the study nearly 66% were males. Maternal history of DM (65%) was more commonly observed as compared to paternal history (57%) and nearly 23% had a history of both parents being diabetic. Fifty two percent gave a sibling history of type 2 DM. Siblings of patients with affected mothers had a greater likelihood of diabetes (77.8%) than those with affected fathers (51%) ($P = 0.001$). More males had a brother who was diabetic (66%), likewise more females had a sister who was diabetic (55%).

Conclusion: Maternal inheritance of DM appears to be more common and there is a significant association of type 2 diabetes among siblings of patients with affected mothers. This apparent association is an area that needs to be explored further.

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1. Introduction

The incidence of Type 2 Diabetes Mellitus (DM) is increasing rapidly and India has the second largest diabetic population in the world next to only China.¹ The risk of developing the disease increases with age, obesity, and lack of physical activity and is also associated with a strong genetic predisposition.² Family studies have shown that type 2 DM is a heritable condition.^{3–5} However, there appears inconsistency in these findings with some studies suggesting a strong maternal association while others claim paternal transmission of diabetes to be more significant.^{3–5}

Maternal transmission appears to be an important factor that is increasingly being studied and various mechanisms have been proposed for this transmissibility such as maternally inherited mitochondrial DNA mutations and deletions, intra-uterine environment and behavioral risk factors particularly non genetic variation in obesity passed on preferentially by the mother.^{6–8} More recent studies however, suggest that though these mechanisms may be important in the transmission of diabetes they probably cannot explain the excess in maternal transmission.⁹ The present study was therefore carried out with the aim of identifying the profile and familial inheritance in type 2 diabetic patients with family history of diabetes.

2. Methods

This was a cross-sectional study carried out over a period of 3 months amongst outpatients and inpatients of the department of general medicine as well as those attending the diabetic clinic of a tertiary care hospital in southern India. The study population included all patients attending these facilities during this period with a diagnosis of type 2 DM and giving a family history of type 2 DM. Patients with type 1 DM, Gestational DM and other forms of diabetes like steroid induced diabetes and Latent Autoimmune Diabetes in Adults (LADA) were not included in the study.

Considering a 13% population proportion of maternal diabetes from previous studies⁹ for an absolute precision of 5% at 95% level of confidence, the required minimum sample size was 174. The required sample of consecutive out patients and in patients fulfilling the inclusion criteria were recruited into the study. Institutional ethical clearance was obtained prior to carrying out the study. An informed consent was obtained from all patients and details of the patients were kept confidential giving them a coded identity.

Study variables included socio-demographic characteristics like age, sex, occupation and place of residence; anthropometric measurements corresponding to weight, height and Body Mass Index (BMI) and biochemical parameters as HbA_{1c} values. Age at onset of type 2 DM and a detailed family history of type 2 DM were also queried. Weight was recorded using a standard weighing scale, kept on a firm horizontal surface to the nearest 100 gm. Height was recorded using a mobile stadiometer to the nearest 1 cm. Body mass index (BMI) was calculated using the formula, weight (kg)/height (m²) and categorized as per the WHO international criteria¹⁰ and HbA_{1c} values were calculated using HPLC-D10 method. Age at which

the patient was diagnosed to have type 2 DM was taken as the age of onset of the disease. Information pertaining to age of onset and duration of type 2 DM in parents and siblings of the participants were also collected. Parents were confirmed to have Type 2 DM on the basis of history and age of onset.¹¹

Statistical analysis was carried out using SPSS version 15. Pedigree charts were used to group and analyze the maternal and paternal inheritance of diabetes.

3. Results

The baseline characteristics of the study participants are as illustrated in Table 1. Of the 174 participants enrolled into the study majority (82%) were over the age of 40 and employed (72%). Most of the females were housewives (78%) and a substantial number of them (64.4%) were overweight with a BMI > 25. Marginally more number gave a history of maternal diabetes (65.5%) as compared to paternal history of diabetes (57.5%), while 39(23%) of the study participants had history of diabetes in both parents. Nearly 52% had a sibling history of type 2 DM.

More males were noted to have a brother who was diabetic (66%), likewise more females had a sister who was diabetic (55%). This association was however not significant. Patients with affected mothers had a greater likelihood of diabetes (77.8%) in siblings than those with affected fathers (51%) as shown in Table 2 and this association was statistically significant. Interestingly, paternal history of type 2 DM showed a significant association with early onset of the disease, which was defined as less than 40 years. Onset of paternal type 2 DM at less than 50 years of age was also noted to have a statistically significant association with early onset of the disease. We however, did not find a similar association with maternal factors (Table 3).

4. Discussion

The study shows a male preponderance of type 2 DM as shown by other studies.^{3,12} This could be a health care seeking bias

Table 1 – Baseline characteristics of study participants N = 174.

Variable	Frequency	Percentage (%)
Gender:		
Male	115	66.1
Female	59	33.9
Age group:		
<=30	07	04.0
31–50	83	47.8
51–70	78	44.8
>=71	06	03.4
BMI:		
Underweight	09	05.2
Normal	85	48.8
Overweight	52	29.9
Obese	28	16.1

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