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**Familial Inheritance in Diabetes Mellitus in South Iranian Population.**

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**Abstract:**

**Background:** Diabetes Mellitus (DM), the most common endocrine disease, is characterized by metabolic abnormalities and by its long term complications.

It is well known that genetic predisposition is an important factor in occurrence of diabetes mellitus but the mechanism of inheritance of this disorder is unclear. The more significance of maternal or paternal inheritance in diabetes has been a matter of controversy and difference in various populations and races, so this study was conducted to evaluate pattern of inheritances in Fars diabetes center referrals as a Southern Iranian population.

**Materials and Methods:** In this study 1056 diabetic patients in Fars diabetes center were interviewed by trained interviewers using a standard questionnaire and information about family history of 1st and 2nd degree relatives of patients were recorded.

**Results:** In this study type II diabetes had more familial aggregation than type I diabetes ( $p < 0.001$ ). Maternal transmission of diabetes was stronger in type II diabetes than type I ( $p < 0.001$ ). Positive family history of diabetes in 2nd degree relative of type I patients was significantly more common than type II diabetic patients ( $P < 0.001$ ). Maternal history of diabetes is stronger than paternal history of diabetes among both type I and type II diabetic populations (type I  $P < 0.05$  and type II  $P < 0.001$ ).

Key Words: diabetes mellitus, family history, gene.

### Introduction:

Diabetes mellitus, the most common endocrine disease, is characterized by metabolic abnormalities and by long-term complications. By the time type I diabetes appears, most of the beta cells in the pancreas have been destroyed and this destruction is almost certainly autoimmune in nature, although details remain obscure. Although type II is more common than type I and more frequently exhibits familial aggregation, its pathogenesis is less well understood <sup>(1)</sup>. The mechanism of inheritance of type I is unclear and genetic predisposition is probably permissive and not causal. Overall, the chance of a child developing type I diabetes when another first-degree relative has disease is only 5-10 percent. HLA identify in a sibling increases the risk. Type I diabetes appears to be a disease in which sexual imprinting plays a role <sup>(1)</sup>. There are strong associations between type I and certain HLA. Although type II occurs in families, modes of inheritance are not known. It is highly likely that ordinary type II is polygenic. Risk to offspring and siblings of patients with type II is higher than in type I diabetes. The more significance of maternal or paternal inheritance in diabetes has been a matter of controversy and difference in various populations and races so this study was designed to compare such inheritances in Fars diabetes center referrals, as a south Iranian population <sup>(1)</sup>.

### Materials and Methods:

This study was conducted in Shiraz, Iran from June, 1998 till April 1999. 1056 ran-

dom cases of type I and type II diabetes who were registered in Fars Diabetes Center were selected. Patients were interviewed by trained interviewers using a standard questionnaire. Informations were recorded in documents. We studied family histories of diabetes mellitus in the first and second degree relatives of 1056 diabetic patients and analyzed the data by SPSS 11 software.

### Results:

From 1056 diabetic patients in Fars diabetes center there was 579 type II and 477 type I patients. 351 (61%) of type II and 254 (54%) of type I patients had positive family history for diabetes, so positive family history was more frequently seen in type II than type I ( $P < 0.001$ ).

54% of type I patients had positive family history, of which 24% had positive history in 2nd degree relatives, 14% in their mothers, 9.6% in fathers, 7.8% in siblings, and 1.8% in offsprings.

61% of type II patients had positive family history, of which 19% in their second degree relatives, 23.4% in their mothers, 11.9% in fathers, 17.8% in siblings, and 3.6% in offsprings .

type II diabetes has more familial aggregation than type I ( $p < 0.001$ ). Maternal transmission of diabetes is more strong in type II than type I ( $P < 0.001$ ), but there was no significant difference in paternal transmission or history of diabetes in siblings between type I and type II patients. Positive family history of diabetes in second degree relatives of type I patients is significantly more common than type II patients ( $p < 0.001$ ).

Maternal history of diabetes is stronger than paternal history of diabetes among both type I and type II diabetic populations (type II  $P < 0.001$ , type I  $P < 0.05$ ).

Table 1- Frequency of different patterns of familial transmission in type I diabetes.

	Frequency (percent)*
Family history in mother	14%
Family history in father	9.6%
Family history in sibling	7.8%
Family history in offspring	1.8%
Family history in 2nd relatives	24%
Negative family history	46%

\* There are some overlapping between different pattern of transmission, so the total percent frequency is more than 100.

Table 2- Frequency of different patterns of familial transmission in type II diabetes.

	Frequency (percent)*
Family history in mother	23.4%
Family history in father	11.9%
Family history in sibling	17.8%
Family history in offspring	3.6%
Family history in 2nd relatives	19%
Negative family history	39%

\* There are some overlapping between different pattern of transmission.

## Discussion:

These findings provide evidence suggesting the more significance of family history among type II than type I diabetic patients, and also more importance of maternal inheritance among diabetic patients. Previous studies have reported higher prevalence of diabetes among mothers of probands with type II diabetes than among fathers. Karter AJ and his colleagues studied the excess maternal transmission of type II in northern Califor-

nia and concluded that this excess maternal transmission observed in all races and both sexes <sup>(2)</sup>.

Klein BE and his colleagues in USA concluded that the difference between frequencies in mothers and fathers was significant ( $P < 0.0001$ ) in the older-onset group <sup>(3)</sup>. In China, Zhange and his colleagues found that among affected patients of type II diabetic mothers were much more than diabetic fathers ( $P < 0.001$ ) and so the more significance of maternal inheritance <sup>(4, 5)</sup>. Studies in South Africa and Caucasian and West Indian patients confirmed the above results <sup>(6, 7)</sup>. However, another study in United Kingdom by Kodaliver and his colleagues showed that paternal influence is stonger than maternal influence in the transmission of type II diabetes <sup>(8)</sup>.

Altobelli E and his colleagues showed that the risk of type I diabetes for children whose fathers are affected by disease is 11 times higher with respect to controls. An interesting result in our study was the more common frequency of positive second degree family history of diabetes in type I than type II, in spite of more frequent, positive family history in type II than type I.

## Conclusion:

Type II diabetes has more familial aggregation than type I. Maternal transmission of Diabetes is more strong in type II than type I. Positive family history of diabetes in second degree relatives of type I patients is significantly more frequent than type II. Maternal history of diabetes is stronger than paternal history, among both type I and type II diabetic populations, regarding the significant role of in-

heritance in DM, screening of diabetes families is recommended for early diagnosis and prevention of diabetic complications.

#### References:

1. Daniel W, Foster. Diabetes Mellitus. In: Braunwald E, Isselbacher KJ, Petersdorf RG, et al, Eds. Harrison's principles of internal medicine, 14th ed. New York: McGraw-Hill, 1998: 2060-2080.
2. Karter AJ; Rowell SE. Excess maternal transmission of type II diabetes. Diabetic care 1999 June; 22(6): 938-43.
3. Klein BE; Klein R. Parental history of diabetes in a population-based study. Diabetic care 1996 Aug; 19(8): 827-30.
4. Zhangs; Qia H. Pedigree investigation of familial non-insulin dependent diabetes mellitus.

Chang Hua 1 Hsueh T sa Chih 1996 June; 76(6): 435-9.

5. Sheu-WH; Song-YM. Family aggregation and maternal inheritance of Chinese type 2 DM in Taiwan. Acta-Diabetol. 1998 Apr; 35(1): 57-60.

6. Young CA; Kumar S. Excess maternal history of diabetes in Caucasian and Afro-origin NIDDM patients suggests dominant maternal factors in disease transmission. Diabetes Res Clin Pract 1995 Apr; 28(1): 47-9.

7. Omar MA; Motala AA. The significance of a positive family history in South African Indians with NIDDM. Diabetes Res Clin Pract 1996 Oct; 34 Suppl: 573-6.

8. Kodaliv R, Sessaiah V. Body mass index and family histories in type 11 diabetic propositi and preliminary observations on the transmission of diabetes in polygamous families. Hum Biol 1997 Jun; 69(3): 393-402.

9. Altobelh-E; Chiavelh-F. Family history and risk of IDDM. Acta diabetol 1996 Apr; 35(1): 57-60.