Research Article

IMPACT OF FAMILY HISTORY IN GLYCEMIC CONTROL AMONG TYPE-2 DIABETES MELLITUS PATIENTS IN ASEER DIABETIC CENTER

Mohammad Ahmad Awwad Al qahtani[1], Noohu Abdulla Khan[2]*, Khaled M Alakhali[2], Sirajudeen S.Alavudeen[2]
[1]Director, Pediatric Endocrinologist, Aseer Diabetic center, Aseer Central Hospital, Ministry of Health, Abha, Saudi Arabia
[2]Department of Clinical Pharmacy, College of Pharmacy, King Khalid University, Abha, Saudi Arabia
*Corresponding Author Email: Shanoohu@yahoo.co.in

ABSTRACT

There is a significant increase in the incidence and prevalence of Diabetes Mellitus (DM) worldwide and in the Kingdom of Saudi Arabia (KSA). Various studies have been shown the relevance of genetic factor in the onset of type-2 diabetes mellitus (T2DM). In this view the study has been conducted to find the correlation between family history and glycemic control among the T2DM patients in Aseer Diabetic Center (ADC), Abha KSA. This is a cross sectional retrospective study. A total of 343 patient's medical records were accessed to evaluate the role of family history in glycemic control. For the purpose of the study patients were randomly selected and divided into four groups (I-without family history; II-with first degree family history; III-with second degree family history and IV-with both first and second degree family history). The HbA1c value was considered as primary outcome measure in each group. In addition to this other factors such as age, duration of DM, BMI (Body Mass Index) were also studied. Among this study population, about 54.81 % of patients had positive 1st degree family history. The mean age for patients without family history is 62.19 (± 9.29) yrs and 59.98 (± 10.39) for patients with family history, which shows that occurring of DM is early in positive family history groups. The HbA1c value in patients without family history and with family history in either sex is not significant ($p < 0.39$). In our study, HbA1c levels show no significant difference between patients with and without family history. In conclusion the family history plays no significant role in glycemic control in T2DM patients in ADC.

Keywords: Family History, Glycemic control, HbA1c and Type-2 Diabetes mellitus.

INTRODUCTION

There is a significant increase in the incidence and prevalence of Diabetes Mellitus (DM) worldwide and this increase is seen across all age groups.[1] It has been estimated that worldwide prevalence of diabetes is 366 million and the number is expected to increase up to 552 million people by 2030[2]. The increase in number of new cases of young people being diagnosed with DM with co-morbid diseases has led to a thorough investigation and research studies regarding the risk factors for Type 2 diabetes mellitus (T2DM).[3] One of these risk factors is the positive family history of DM.[4] Studies have estimated that the risk for T2DM increases approximately two- to-fourfold when one or both parents are affected[5,6]. In addition, the presence of a family history of diabetes has been correlated with high fasting plasma levels of glucose, lipids[7], systolic blood pressure[8] and body mass index (BMI).[9] The development of Type 2 DM has a genetic component which plays an important and a very essential role. There is an increased risk among the children of diabetics for the early onset of Type 2 DM since they share the genetic resemblances[10]. Family history of type 2 DM seems to increase the risk of hypertension, dyslipidemia and atherogenesis leading to coronary heart disease (CHD) in non diabetic subjects.[11] Rapid economic growth, epidemiologic transition during the last 4 decades in Kingdom of Saudi Arabia (KSA) led to a remarkable change in living standards and conversion and adoption to 'Westernized' lifestyle, characterized by unhealthy dietary patterns and decreased physical activity,[12] which is attributed to the dramatic changes in lifestyle, in addition to genetic predisposition of Saudi people to diabetes and a high prevalence of consanguineous marriages,[13] which is considered as the main reason for positive family history in most of them. The First-degree relatives of diabetic patients have long been known to have an increased risk of developing early T2DM.[14,15] However, little is known about family history in the Saudi population, with type-2 DM. Compact data only available regarding the impact of family history on glycemic control and other contributing factors in glycemic control. By keeping this in mind the study was done and the main objective of this study is to know the impact of family history in glycemic control among the type-2 DM patients in Aseer Diabetic center (ADC).

MATERIALS AND METHODS

This is a cross sectional retrospective study of patients which included all adult type 2 DM patients who were registered in the ADC, Abha, Aseer Region, KSA. This study was conducted from December 2012 to December 2013. A total number of 343 patient's records were randomly selected from the patient medical records section. Patients of Type-2 DM of age group from 18 years to 80 years of either sex with regular follow up were included in the study. Medical record of the patients who fulfilled the criteria was reviewed and the data was entered in the specifically designed data collection form. The patients were divided into four groups following as patients without family history (Group-I), Patients with First degree family history (Group-II), Patients with second degree family history (Group-III) and patients with first and second degree relative family history (Group-IV). Data obtained from the patient records included: age, duration of DM, BMI (Body Mass Index). The HbA1c value was considered as primary outcome measure in each group. Current guidelines for glycemic control recommend HbA1c values < 7 % as a treatment goal for most DM patients. The whole study period was divided in to four visits, each visit comprised of 3 calendar months. The visit one and visit four data was considered in this study to measure the status of the glycemic control of the patients. Gestational Diabetes Mellitus (GDM), Type-

1 diabetes mellitus and patients less than 18 years and more than 80 years, patients who were not in regular follow up were excluded from the study. All 343 patient's data was analyzed for this study. The collected raw data was recorded and statistically analyzed with Windows Microsoft Excel 2007. Descriptive statistics of Mean, standard deviation (SD) and frequencies were performed on the sample, one way ANOVA was used to analyze the continuous data by using graph pad prism software version-5; $p \leq 0.05$ was considered statistically significant. This study was formally approved by the University Research Ethics committee (Approval number- REC#2013-05-05).

RESULTS

Family history is one of the contributing factors in type-2 DM. Demographic data of the study population with family history is represented in Table 1. Total numbers of patients were 343. The family history among the study population is classified in to four groups. Group-I without positive family history, group-II patients with family history of first degree relatives, group-III patients with family history of second degree relatives and group-IV patients with family history of both first and second degree relatives.

Table 1: Demography of Patients with Family History

Groups	Family History	Number of patients	%	Male	Female
Group-I	Without family history	99	28.86	65	34
Group-II	1st Degree relatives	188	54.81	116	72
Group-III	2nd Degree relatives	5	1.46	4	1
Group-IV	Both 1st and 2nd Degree relatives	51	14.87	28	23

Among this study population, patients in group-I were 99 (28.86 %) among them 65 were male and 34 were female. Patients in group-II were higher in number (n = 188), male patients were 116 and females patients were 71. About 54.81 % of patients had positive 1st degree family history. Group-IV patients were found to be 51 (14.87 %). In comparison to these groups the group - III is too low (1.46 %) in this study population. Glycemic control variations due to family history were analyzed and the data are represented in Table 2. The mean age in patient group without family history (Group I) was higher when compared to patients with positive family history (Group II, III and IV). The mean age of patients without family history is 62.19 (± 9.29) years which shows that occurring of DM is early in positive family history groups and the BMI was found to be 29.63 ± 6.52 kg/m^2. The patient group without family history is having low BMI when compared with positive family history. However, surprisingly the HbA1c levels showed no statistical significance in patients with and without family history (Table 2). The patients in group-I is having low BMI compared to group-II and the group IV and also the disease duration was found to be more, 17.13 ± 7.91 years when compared to other positive family history groups.

Table 2: HbA1c values and other contributing in patients with positive Family history

Groups	Family History	Age in yrs (Mean ± SD)	Duration in yrs (Mean ± SD)	BMI in kg/m^2 (Mean ± SD)	HbA1c in % (Mean ± SD)
Group-I	Without family history	62.19 ± 9.29	17.13 ± 7.91	29.63 ± 6.52	9.52 ± 2.13
Group-II	1st Degree relatives	59.98 ± 10.39	15.95 ± 7.55	30.37 ± 5.61	9.78 ± 2.12
Group-III	2nd Degree relatives	55.8 ± 8.59	12.8 ± 4.83	28.89 ± 6.52	9.18 ± 1.39
Group-IV	Both 1st and 2nd Degree relatives	59.24 ± 10.35	14.75 ± 6.61	30.31 ± 6.20	9.77 ± 2.01

Impact of family history in glycemic control and other contributing factors in the study population by gender wise was analyzed and the data are represented in the Table 3. The mean age in Male patient group without family history was found to be 62.88 ± 9.0 years, which is high when compared to female group with 60.91 ± 9.68 years. Duration of DM is also high in male group compare to female group. The mean duration of DM in male patients were 18.23 ± 7.57 years where as in female patients it was 15.09 ± 8.13 years. The mean age, duration of DM in patients with 1st degree relatives was high in male patients compared to female patients. But the duration of DM in group of patients with both 1st and 2nd Degree relatives was found to more in female patients compared to male patients. The female patients in this group have 16.78 ± 6.65 years as duration of DM where as male patients are having 13.07 ± 6.08 years.

Table 3: Gender wise difference in patients with family history and their Glycemic control

Male Patients Family History	n (%)	Age in yrs (Mean ± SD)	Duration in yrs (Mean ± SD)	BMI in kg/m^2 (Mean ± SD)	HbA1c in % (Mean ± SD)	95 % CI of diff	*p* value*
Without family history	65 (18.95)	62.88 ± 9.00	18.23 ± 7.57	27.31 ± 4.92	9.36 ± 2.20		0.39
1st Degree relatives	116 (33.81)	60.66 ± 10.97	16.47 ± 7.96	28.79 ± 4.77	9.56 ± 2.15	-1.01 to 0.60	
2nd Degree relatives	4 (1.16)	53.75 ± 8.44	11 ± 3.61	26.36 ± 4.59	9.45 ± 1.44	-2.77 to 2.59	
Both 1st and 2nd Degree relatives	28 (8.163)	57.11 ± 10.54	13.07 ± 6.08	28.46 ± 5.80	10.21 ± 2.31	-2.02 to 0.32	
Female Patients Family History							
Without family history	34 (9.91 %)	60.91 ± 9.68	15.09 ± 8.13	33.93 ± 6.92	9.80 ± 1.97		0.09
1st Degree relatives	72 (20.69)	58.89 ± 9.24	15.11 ± 6.73	32.95 ± 5.92	10.14 ± 2.02	-1.27 to 0.60	
2nd Degree relatives	1 (0.29)	64	20	39.03	8.1	-1.04 to 4.44	
Both 1st and 2nd Degree relatives	23 (6.70)	61.83 ± 9.49	16.78 ± 6.65	32.58 ± 5.92	9.23 ± 1.38	-0.65 to 1.79	

*p value <0.05 considered as significant

When compared to male patients BMI was found to be high in female patients despite of positive or negative family history. Male patients had BMI between 26.36 to 28.79 kg/m^2; female patients had BMI between 33.93 to 39 kg/m^2. The HbA1c values in male patient group was found to be $\geq$ 9 %, the group IV patients HbA1c was found to be 10.21 ($\pm$ 2.31) %. The HbA1c value in comparison to patients without family history to other positive family history group in male patient group was found to be non significant ($p < 0.39$). The results in the female patients group differs with the male patient group in the HbA1c values. Among the female patients, the patients with 1st degree family history is having high HbA1c value 10.14 ($\pm$ 2.02) % in comparison to patients without family history. The HbA1c value in comparison to patients without family history to other positive family history group in female patients also was found to be non significant ($p < 0.09$).

DISCUSSION

In this study more than 50 % of the study population had first degree family history. In an average of the patients with positive family history is $\geq$ 69 % where as the patients without family history was to be only 28.86 % which nearly equal to 50 % of the positive family history. This study is consistent with other study[16,17] The mean age at disease onset is found to be 44 years. The patients who had positive first degree relative family history developed DM at the age of 44 years in males and 43 years in females which also coincides with the other study conducted in KSA[12], in Finland [18] and in korea.[19] The BMI was found to be high in female patients when compared to male patients which was reflected in other studies conducted in KSA,[17] in Qatar[16] and in India.[11] The HbA1c levels were $\geq$ 9 % in the patients with positive family history which is high in comparison to other study in Jordan[20] and in India.[11] the glycemic control target is achieved less in this population which is consistent with other studies done in KSA[13,17].

CONCLUSION

In conclusion the family history plays a role in early onset of diabetes; the children of positive family history parents will get DM in early ages which will leads to uncontrolled hyperglycemia has been reflected in this study. In this study hyperglycemia and other contributing factors were identified without any impact of the family history in glycemic control in all groups and without significance difference in the glycemic control. Family history of diabetes is also used as a predictor of T2DM in population-based screening programs.[15] However; roughly half of the risk of T2DM can be attributed to lifestyle, and half to genetics. Lifestyle modification is particularly effective in the prevention or delay of progression to diabetes among individuals with a family history of diabetes. The Arab populations are known to have a genetic predisposition to diabetes, dietary patterns and physical activity play an equally important role in its cause.[13] Some studies have been conducted regarding family history in Arab population, a study in Qatar[16] found that obesity, family history, and smoking habits were equally associated with diabetes. In this study surprisingly the HbA1c levels showed no statistical significance in patients with and without family history this observation needs further investigation using molecular and pharmacogenomic study tools to understand the mechanism involved in maintaining the HbA1c levels in patients with positive family history.

Recommendation

Making awareness among the diabetic population about the impact of family history and consanguineous marriages will improve the present situation. Having a physical activity educator and establishing a preliminary gym or starting diabetic health club in diabetic centers will be a step forward in reducing the DM burden in this community.

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