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Research Article

**STUDY TO IDENTIFY EXISTENCE OF ASSOCIATION
BETWEEN FAMILY HISTORY OF DIABETES AND
SUSPECTED CASES**Dr Fawad Ahmed^{1,3}, Dr Aliya Latif², Dr Afifa Chaudhary³¹ Lahore General Hospital, Lahore² Sharif Medical City Hospital, Lahore³ House Officer, Sir Ganga Ram Hospital, Lahore**Article Received:** February 2020**Accepted:** March 2020**Published:** April 2020**Abstract:**

Background: Type-II Diabetes is a major global health risk and is often associated with genetic inheritance of diabetes.

Objectives: The aim of the study was to identify whether an association exists between family history of diabetes and suspected cases of diabetes.

Study Design: Cross Sectional Study.

Place and Duration: This study was conducted in screening camps of Services hospital Lahore for the duration of one year from December, 2018 to November, 2019.

Methodology: Total number of 2000 persons were included in the screening process. People with BSR \geq 200mg/dl were labelled screened positive for diabetes. People with BSR $<$ 200mg/dl were categorized as Normal. Family history of any family member having diabetes was taken for all participants. The members of the family only included immediate blood relations like mother, father, brother, sister and grandparents. Data was entered in SPSS 20 for analysis. Frequency distribution and percentage were calculated for age, gender, screening for diabetes and family history of diabetes. Chi square was used as a test of significance for association between family history and diabetes.

Results: People aged 25 and above were screened for diabetes. 104 people were screened positive for diabetes. 67.9% were females and 32.1% were males. Mean age was 43 \pm 12.61 years. In Normal category, 90.3% people had no family history of diabetes in their family while 9.7% reported positive family history. In screened positive for diabetes category, 64.7% people did not report any history of diabetes in their family where as 35.3% reported having positive family history. The association between diabetes and family history was found to be statistically significant.

Conclusion: Risk of diabetes is associated with a positive family history of diabetes. Screening for early detection should be performed regularly for people with positive genetic risk of diabetes to ensure prevention and control of complications.

Keywords: Diabetes, Family History, Genetics, Early detection.

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INTRODUCTION:

Diabetes mellitus (DM), referred commonly to as simply diabetes, is a chronic and debilitating disease that occurs due to autoimmune destruction of pancreatic beta cells (Type-I diabetes), or when the body cannot produce sufficient insulin for its requirements (Type-II Diabetes).[1] This leads to metabolic and cardiovascular disorders due to consistently high blood sugar levels for prolonged time periods.[2] The International Diabetes Federation (IDF) guidelines classify individuals with glucose values between 100 and 199 mg/dl (5.6–11.0 mmol/L) as pre-diabetics and beyond 200mg/dl as diabetics. Symptoms of consistently high BSR include recurrent urination, intensified thirst and hunger. If left un-treated, diabetes may lead to development of micro-vascular and macro-vascular disorders. Acute complications include diabetic ketoacidosis, hyperosmolar hyperglycemic state, or death.[3] Serious long-term complications include CVDs, nephrosis, foot ulcers, neuromuscular disorders and loss of vision. [4,5]

Since 1980s, the number of diabetics has increased from 108 million (4.7%) to 382 million in 2013 and this figure is estimated to rise up to 592 million by the year 2035.[6] In 2012, diabetes was responsible for approximately 13.5 million deaths directly whereas 2.2 million deaths were indirectly associated with high blood sugar levels. The WHO estimates that the 7th leading cause of death in 2030 shall be attributable to diabetes alone. According to The Diabetic Association of Pakistan, the prevalence of Type-II Diabetes (T2DM) above the age of 25 years is more than 10%.

Diabetes Mellitus is associated with several environmental factors and genetic influences. Environmental risk factors having an impact on development of diabetes include stress, obesity and imbalanced nutrition.[7] Multiple genes have been identified responsible for development of diabetes indicating a polygenic origin of Type-II diabetes. Maturity onset diabetes of the young (MODY) is ascertained to mutations in more than 6 identified genes encoding the glucose sensor enzyme glucokinase and transcription factors.[8]

The genetic influence on the onset of diabetes is undeniable from strong historical evidence of patterns of diabetes inheritance in families.[9] Inheritance pattern of diseases and susceptibility of specific ethnic groups towards diabetes is well documented. [10,11] Population based research

indicate genetic transmission of T2DM ranging between 20% - 80%. Evidence for genetic tendency is derived from a multitude of population based, family, and twin sibling's studies.[12] The relative risk of developing T2DM is approximately 3 if person is related to one affected parent or brother/sister in comparison to the general population, and this rises up to ~6 when both the parents are affected.[13] The results, however, show variation between ethnicity, geographic and environmental factors.

Outcome of medical interventions for management of diabetes mellitus is dependent on earliest diagnosis and prevention of commencing complications. Familial and genetic patterns may predispose a person to early onset of diabetes without their awareness. Current state of knowledge is not complete and scientific basis for most of the inherited risk is limited due to lack of availability of data over diverse ethnic and geographic regions. A holistic approach is required to identify a linkage between the genetic tendencies which leads to diabetes.

METHODOLOGY:

This Cross-Sectional study was conducted in screening camps of Services hospital Lahore for the duration of one year from December, 2018 to November, 2019. Multistage purposeful sampling technique was used for the selection of people with age of ≥ 25 years. These all were screened for BSR.

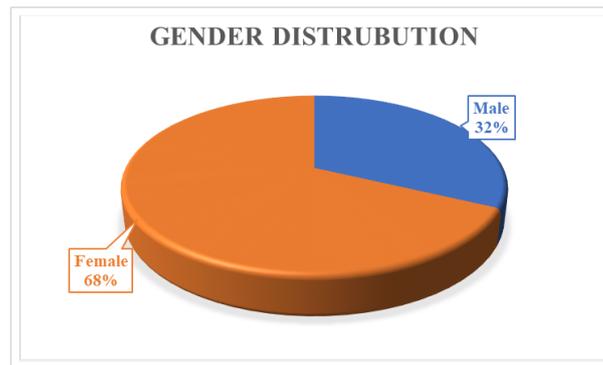
2000 people from general population, aged 25 and above were screened for diabetes in screening camps of Services hospital Lahore. From the screened population, 104 people had BSR value ≥ 200 mg/dl and were labelled screened positive for diabetes. These screened positive people were inquired about history of any known diabetics in their families. Data was recorded from interviews of the selected cases if any member of their family had any diagnosed and confirmed cases of diabetes. The members of family included only immediate blood relations like mother, father, brother, sister and grandparents. Data was verified for completeness and entered in SPSS 20 for analysis.

RESULTS:

In current study, 2000 people aged 25 years and above were screened for diabetes. 67.9% were females and 32.1% were males. Mean age of the population (limited to 25 years age) was 43.8 ± 12.61 years. In the study population, a total of 104 were screened positive for diabetes ($BSR \geq 200$ mg/dl).

Table No 01: Gender Distribution

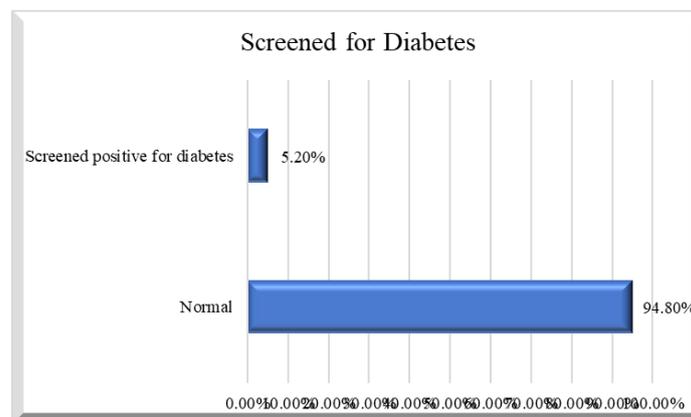
Gender	Qty	%age
Male	642	32.1%
Female	1358	67.9%
Total	2000	100%



After screening, members of population with BSR<200mg/dl were categorized as Normal, while those with BSR \geq 200mg/dl were categorized as suspected diabetics.

Table No 02: Frequency Distribution of Screened Positive for Diabetes in Study Population

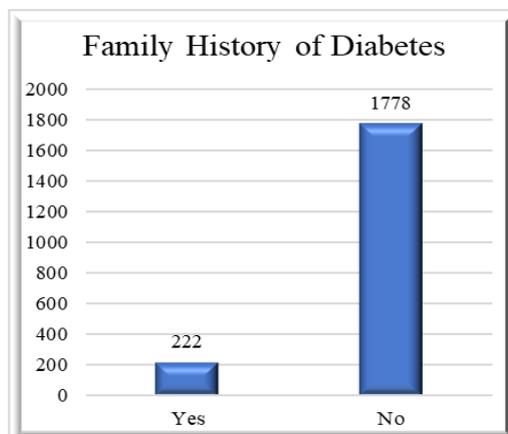
Diabetes	Qty	%age
Normal	1896	94.8%
Screened Positive for Diabetes	104	5.2%
Total	2000	100%



Family history of the sample population was taken, where the respondents reported if any member of their immediate blood relations had a confirmed case of diabetes. Only mother, father, brother, sister and grandparents were included in the selectable options to ensure genetic relationship. The answer was recorded in Yes or No.

Table No 03: Frequency of Family History of Diabetes in Study Population

Family History of Diabetes	Qty	%age
Yes	222	11.1%
No	1778	88.9%
Total	2000	100%



In the group categorized as Normal, 90.3% people had no family history of any diabetics in their family while 9.7% reported having at least one diabetic family member. In the group categorized as screened positive for diabetes, 64.7% people did not report any history of diabetes in their family whereas 35.3% reported having at least one diabetic member in their family.

Table No 04: Cross Tabulation Between Diabetes and Family History of Diabetes

Screening for Diabetes	Family history		Total	Pearson's Chi-square
	Yes	No		
Normal	184 (9.7%)	1712 (90.3%)	1896	0.000
Screened Positive for Diabetes	37 (35.58%)	67 (64.42%)	104	
Total	221	1779	2000	

The association of screened positive suspected diabetes with family history of diabetes was highly significant with a Pearson's chi square value of 0.000.

DISCUSSION:

Diabetes is an emerging global epidemic of the 21st century. It is a debilitating disease with a high prevalence. Complications of diabetes are not only incapacitating to the patient, but also a high economic burden on the society and the healthcare system. Like cancers and hypertension, diabetes has a strong genetic component. These districts were selected for the study due to their geographic location and demographics. A large study sample was selected for the study to identify the association between diabetes in screened positive people and their family history of any family member who was a diagnosed case of Type-II diabetes. Cases were selected on the criteria having BSR ≥ 200 mg/dl. The global guideline state that the people with random BSR between 140mg/dl and 199mg/dl are also suspected diabetics (pre-diabetes). However, the

sample population criteria was set for BSR ≥ 200 mg/dl to ensure the relatively high susceptibility of diabetes in the study population and generalizability of the results.

Our study showed that a significant pattern in people who were screened positive for diabetes also had a family history of at least one family member with diabetes. This coincides with study by Kral et.al who discovered the relationship of family history and risk of Type-II diabetes by ancestry.[14] In a study conducted in immigrants to western countries, it was seen that individuals with three or more siblings and parents with diabetes presented with the lowest levels of insulin secretion in body.[15] Our study showed that risk of development of diabetes is directly associated with a positive family history of diabetes. In a study conducted in Tehran, the Iranian

population family tree was mapped for evaluation to identify pattern of transmission of diabetes in suspected cases aged 20 and above. The methodology was like the current study. The results showed that there was predominantly familial transmission of diabetes in 53% among siblings and 44% among offspring.[16]

CONCLUSION:

With the rising burden of diabetes and imminent increase in risk of developing complications due to late detection, understanding the familial pattern of diabetes is important to ensure that people who are at high risk should be screened regularly for prevention and control of diabetes. Further research and hereditary investigations are required to improve genetic counselling, proper treatment and familial risk assessment for individuals with diabetes.

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