Review Article ISSN 2639-9326

Diabetes & its Complications

Understanding Genetic and Cultural Disparity in Management of Type 2 Diabetes

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Received: 19 April 2019; **Accepted**: 04 May 2019

Citation: Nuzhat Chalisa. Understanding Genetic and Cultural Disparity in Management of Type 2 Diabetes. Diabetes Complications. 2019; 3(1): 1-3.

ABSTRACT

Today, it is well established that development of type 2 Diabetes results from an interaction between individual biological and genetic makeup and environmental factors. Type 2 Diabetes has been disproportionately increasing in minority populations. Non-Caucasian populations, such as Hispanics, African-Americans, American Indians, and Asians are much more likely to develop type 2 Diabetes and less likely to maintain effective control. Certain ethnic populations have higher risk of complications from Diabetes like Coronary Artery Disease, limb amputations, Retinopathy and kidney failure. Several pathophysiological studies have documented a higher prevalence of insulin resistance in these populations, even after correcting for obesity and lifestyle factors.

Keywords

Genetic, Cultural, Disparity, Minority group, Lifestyle, Environment.

Based on CDC data from 2017, over 30 million Americans have been diagnosed with type 2 Diabetes and another 7 million are suffering from undiagnosed diabetes. Out of the 30 million, 15.1% are American Indian, 12.1% are African American, 12.7% are Hispanic and Native American, 8% are Asian American, and 7.4% are Caucasian.

Scientist have linked several gene mutations to a higher risk of diabetes. Not everyone who carries a mutation has diabetes. Individually the contribution from each gene mutation is very small. However, the risk significantly increases when combined with a host of environmental and cultural factors.

Cultural factors like eating habits, food choices, religious beliefs and lack of trust in the system has a big impact on development of diabetes so does medical and environmental factors like obesity, family history, hypertension, high triglycerides and history of gestational diabetes. The good thing is that many of these factors are modifiable.

Minority groups like African Americans, Asians, Native Americans, and Hispanics are more likely to develop type 2 diabetes and less likely to maintain effective control.

When compared to Non-Hispanic Whites African Americans have 77% higher risk of developing diabetes over all. They also have 3 times higher risk of developing CKD and ESRD. African Americans have 2.2 times higher risk of getting hospitalized for diabetes and 2-3 times higher risk of death from complications of diabetes.

In one study comparing increased incidence of DKA in African American population, cessation of insulin was a major precipitating factor. 40% stopped insulin due to lack of means to get refills for insulin and another 25% stopped due to fundamental misunderstanding of the role of insulin on sick days. Rest of the 33% did not have a specific reason. Nearly 2/3rd of the cases could have been prevented if they had resources to get insulin and better understanding of what it does.

Looking at the Non-Hispanic group, risk of diabetes was 66% higher than Non-Hispanic whites. Hispanics are 84% more likely to develop diabetic retinopathy and 1.7 times more likely to develop ESRD. Hispanic population is composed of culturally distinct subpopulations and the prevalence of diabetes can differ in these subpopulations. Prevalence increases with age and is higher

in women and has been shown to be related to the lenth of stay in United states.

Risk of diabetes in American Indians and Native Americans is by far the highest amongst all racial and ethnic groups. Clinical characteristics of diabetes in this group includes obesity, insulin resistance, insulin secretory dysfunction and increased endogenous glucose production.

A recent study showed a role of a specific gene mutation which is found in one in 100,000 people worldwide. In Pima Indians the prevalence of this gene mutation is 1 in 33 people. Thus emphasis on the need for more genetic work to be done in isolated populations.

Asian Americans have 30% higher risk of diabetes compared to Non Hispanic Whites. The Asian American group by itself is very diverse and represents 16 different ethnicities. Asians tend to develop diabetes at a lower BMI compared to their white counterparts. Asians are also at higher risk of developing gestational diabetes at a lower body weight.

Among the Asian sub-groups, South Asians had the highest prevalence. South Asians are shown to have more insulin resistance and rapid decline in beta cells at a younger age compared to Caucasians. It has also been postulated that early impairment of beta cell function in certain ethnic minorities could be due to under nutrition that leads to abnormal pancreatic development, however data supporting this hypothesis is inconclusive. South Asians have a unique phenotype with high waist measurements indicating central body obesity. This is associated with a characteristic metabolic profile with high insulin levels, greater degree of insulin resistance and high prevalence of diabetes and prediabetes. Based on certain cord blood studies in South Asian newborns, insulin resistance is present at birth.

With the exception of few epidemiological studies most of the trials done in united states are based on Caucasian population. Despite academic interest, participation of minorities in clinical trials is very scant. One NIH study showed most participants from ethnic groups will participate in phase one trial but leave before the start of phase 2 when actual randomization occurs.

Disparities in diabetes management occurs worldwide. One study done in Europe aimed at studying literature on prevalence of diabetes among immigrants in Nordic countries. Increased prevalence of diabetes was found in European immigrant population particularly from South Asia and Middle East.

Another study from Oslo Norway compared quality of care for patients with diabetes in ethnic immigrants vs Norwegians. Diabetes was diagnosed at a younger age in ethnic population and proportion of patients with poor glycemic control with hga1c over 9.0 was higher in ethnic group compared to Norwegians.
With growing minority population in united states several organizations have identified the need to address these disparities and its impact on minority population.

The American Diabetes Association has taken a lead to increase its advocacy efforts by establishing various programs towards this goal. The Diabetes Action Council invited leadership from different communities including physicians, nurses, diabetes educators, and physician assistants from within the community. These leaders then take ADA preventive care and educational program to their respective communities.

The National Diabetes prevention program is partnership of several public and private organizations working together to prevent or delay type 2 diabetes. The National diabetes education program was initiated in 1997 jointly by centers for disease control and National institute of health to promote early diagnosis and to improve treatment and outcome of people with type 2 diabetes. Initial program was focused on improving blood glucose based on DCCT data however they have recently launched a new program for optimal control of blood pressure and lipids.

The Dream Project is a five year community based research study on Asian American health being conducted at the NYU medical center. Goal is to implement a community health worker program designed to improve diabetes and diabetes related complications in south Asian community in New york city.

International Diabetes Federation is an umbrella organization of over 230 national diabetes associations in 170 countries headquartered in Brussels, Belgium. This organization leads global diabetes community with a common goal of raising awareness of diabetes, promoting prevention and appropriate care and encouraging activities towards the cure of diabetes.

Based on International Diabetes Federation by 2040, 640 million people will have diabetes worldwide. It is crucial to recognize the differences in genetic makeup cultural and environmental risk factors for diabetes in different ethnic populations.

Key element to overcome cultural barriers during patient to physician interaction is to use effective communication. We need educational material tailored for patients with low literacy and limited English proficiency to confirm patient understanding.

Another important factor is cultural perception of health. Diabetes education plays an important role in Diabetes self-management. Awareness of the need for cultural sensitivity is the first step towards providing sensitive and competent Diabetes education. Diabetes educators need to be mindful of cultural traditions and customs among different ethnic groups to recognize any socio economic challenges that may exist.

The large scope of Diabetes in minority population with diverse genetic and cultural backgrounds calls for more therapeutic trials involving minority populations and an investigation into the cause of increased susceptibility and preventive efforts at an individual and population level. Genetic and cultural diversity

should be considered when making guidelines. It is imperative that practitioners and policymakers address these ethnic disparities with a sense of urgency.

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